

Kew Bulletin

PUBLISHED FOR THE ROYAL BOTANIC GARDENS, KEW
FORMERLY THE "BULLETIN OF MISCELLANEOUS INFORMATION"

No. 3, 1958

Lotus in Africa south of the Sahara (excluding the Cape Verde islands and Socotra) and its distinction from *Dorycnium*

J. B. GILLETT

Lotus is taxonomically difficult in most parts of its range and its Tropical African representatives are no exception. Many of them also illustrate the rule that taxonomic difficulties occur in African plants with perennial woody rootstocks and herbaceous stems which are cut back by annual grass fires. It will perhaps never be possible to secure complete agreement among botanists on the delimitation of species in this area: whole-hearted 'lumpers' will wish to unite all the species here recorded from Africa south of Ethiopia, except *L. corniculatus* and *L. arabicus*, as forms of *L. discolor* E. Mey. agg. while extreme 'splitters' will wish to divide *L. goetzei* as it is treated here. A really well grounded treatment must await transplanting and breeding experiments, and observations on the effects of protecting individual plants from fire for several years.

A. PROCEDURE.

All specimens cited have been seen, except those enclosed in brackets, and are at Kew, unless otherwise indicated. In the descriptions of new taxa statements enclosed in square brackets are derived from specimens other than the type. The titles of works referred to more than once are set out in the bibliography where this seems convenient. The author's thanks are due to the authorities in charge of the herbaria at Brussels and Upsala for the loan of specimens and to Dr. H. Wild for making available a large number of specimens from Southern Rhodesia and thus enabling decisions to be reached on the three difficult species of *Lotus* in that country.

B. CHARACTERS USED IN CLASSIFICATION.

Number of leaflets in the bract. Much use has been made of this character, especially by Brand (1898). It does not however appear to be completely constant in any species of which much material has been available for study.

While it is possible that species described from one or a few specimens only may still prove to have uniformly 1- or 3-foliate bracts, when plenty of material becomes available, it seems wise only to say 'bracts *usually* 1-foliate' or 3-foliate as the case may be.

Number of seeds. This character is apt to vary because of such factors as the supply of water, nutrients and pollen. The number of ovules is a more fundamental and less variable character. It can usually be determined without too great difficulty if a dissected flower is mounted on cellotape, a drop of gum chloral placed on the ovary, and the preparation then sealed with cellophane. The gum chloral after a while clears the ovary and the ovules can be counted by transparency.

Size of flower. The size of the corolla varies to some extent with environmental conditions and the stage of development of the flower. The most satisfactory measurement to make is the length of the style which, in *Lotus*, is rigid and subsistent.

Length of calyx lobes. This character must be used with caution, it often varies considerably within a species or even on a single plant.

Colour of flower. Subgenus **Lotus** is divided into two groups by the colour of the corolla. These groups appear to be natural, although it has hitherto proved impossible to find a more tangible and lasting character invariably correlated with the difference in colour. It is therefore important that collectors should note the flower colour carefully. It is the basic colour of the petals that is important, red streaks and tips occur both in the yellow and in the white or rose coloured flowers.

Colouration of seeds. The distinction between species with uniform and those with marbled seeds was much used by Brand (1898). However, as several authors have pointed out, this character is much less reliable than he seems to have thought; in *L. arabicus* and its allies both kinds of seeds occur in one species and sometimes in the same pod.

Indumentum of ovary. This is discussed at length under no. 17, *L. hebecarpus*.

Basal angle of leaflet. This is the angle formed by the two edges of the leaflet as they converge at the top of the petiolule.

C. GENERIC LIMITS.

Lotus in Tropical Africa, as usually defined, is easily separated from all other genera. The reverse is true, however, when the whole genus is considered; indeed for 70 years botanists dealing with the genus have been divided into a North American school, following Greene (1890) and Ottley (1923, 1944), which places in **Lotus** some 60 N. American species that the rival Old World school, following Bentham (1865), Taubert (1894) and Brand (1898) excludes, either wholly or for the most part, as **Hosackia**. Some of the N. American species are so close to **Lotus** s. str. that it seems difficult and unnatural to exclude them; on the other hand these species are connected by easy stages with others which have obtuse keels much shorter than the wings, up to 19 pinnately arranged leaflets and membranaceous stipules, or short, sharply curved, indehiscent fruits. If the diagnosis of **Lotus** is extended to include these species it becomes impossible to exclude the old world genera **Dorycnium** and **Helminthocarpus**. Larsen (1955, 1956)

who is studying the chromosomes of this group tends to support this wider view of **Lotus**, but he has so far examined the chromosomes of rather few species outside **Lotus** s. str. itself.

After studying the accounts of the two schools of botanists cited above it seems that only one rather slight character can be found to separate **Lotus** s. str. from **Hosackia**.

Lotus: leaflets 5, the lower pair (of which one member is occasionally absent) at the base of the rhachis, simulating foliaceous stipules, very close to the true stipules which, if present, are reduced to glands; or, less often, leaflets 3, with petiolules but without petiole or rhachis.

Hosackia: leaflets 3 with a definite petiole or rhachis; or 4-19, pinnately arranged, often alternate, the lowest above the base of the rhachis and well separated from the glandular or membranaceous stipules.

Even this definition fails for *L. roudairei* Bonnet from Morocco which has up to 6 leaflets alternately pinnate, the lowest well above the base of the rhachis and separated from the glandular stipules just as in **Hosackia**.

The solution of this problem requires an intensive study of the whole tribe and failing this it seems best to accept provisionally the prevailing old world view based on the last survey of the tribe, that of Taubert (1894). If this narrow definition of **Lotus** is used **Dorycnium** may be retained as a distinct genus, whose separation from **Lotus** must now be considered, since our No. 11 *L. quinatus* and its var. *brachycarpus* have each independently been placed in **Dorycnium** by thoroughly competent botanists and, if the distinction adopted by Webb (1842), namely that, **Dorycnium** differs from **Lotus** simply in its shrubby habit, is to be followed, there seems no good reason why other tropical African species, especially *L. goetzei* should not be transferred. While the difference in habit is, in the Mediterranean region, important, and, no doubt, has been partly responsible for the unanimity with which recent taxonomists have retained **Dorycnium**, the classical difference between the genera, accepted by Bentham (1865), Boissier (1872), Taubert (1894) and Rikli (1901) is **Lotus**—keel rostrate: **Dorycnium**—keel erostrate. By this criterion both *L. quinatus* and all other tropical African species must stay in **Lotus**.

However the matter is not to be settled quite so simply. In the first place *Dorycnium hirsutum* (L.) Ser., a Mediterranean species, which in other respects seems closer to the rest of **Dorycnium** than to **Lotus**, and which all recent authors have kept in **Dorycnium**, has a short but well-marked beak to its keel, comparable to that in several species of **Lotus**, for instance *L. goetzei*. *D. hirsutum* may be retained in **Dorycnium** by reference to its alae which are much longer than the keel, although they do not adhere together beyond its tip as in most other species of **Dorycnium**. The revised distinction between the genera thus becomes **Lotus**—carina distinctly rostrate, alae not, or hardly, longer than the carina, not adhering together beyond its tip. **Dorycnium**—carina not, or shortly, rostrate, alae markedly longer than the carina, usually adhering together beyond its tip.

This revised criterion for separating **Dorycnium** from **Lotus**, when applied to a group of 3 shrubby species from the Canary Islands which was first placed in **Dorycnium** by Webb (1842) and described as section

Canaria by Rikli (1900, 1901) merely strengthens the impression derived from their whole aspect that these species are more closely related to **Lotus** than to **Dorycnium**, as their keels are as long as the wings and beaked. It is strange that Rikli (1901) left these three species in **Dorycnium**, which he had just distinguished from **Lotus** by its 'stumpfe schiffchen' when his own plate clearly shows the long-beaked keel of *D. broussonetii*. In **Lotus** they form a well marked subgenus.

Lotus subgenus **Canaria** (Rikli) Gillett.

Dorycnium section *Canaria* Rikli, Ber. Schweiz. Bot. Ges. 10: 15 (1900).

Stem woody, leaflets large and broad, leaf rhachis more than 1 cm. long, not prolonged beyond the lateral leaflets, bracts soon caducous or perhaps sometimes absent, claws of alae and carina longer than the calyx tube.

Type species *L. eriophthalmus* Webb.

1. **L. eriophthalmus** Webb in Webb & Berthelot, Phyt. Canar. t. 59 (185.1837).

Dorycnium eriophthalmum (Webb.) Webb, ibid. 2: 88 (Aug. 1842).

2. **L. spectabilis** Choisy ex DC., Prod. 2: 211 (1825).

D. spectabile (Choisy ex DC) Webb, ibid. 89 (1842), t. 58 (Jan. 1843).

3. **L. broussonetii** Choisy ex DC, ibid. (1825); Webb, ibid. t. 57 (1837).

D. broussonetii (Choisy ex DC) Webb, ibid. 90 (1842).

Rikli does not mention any species in his 1900 description of **Canaria** but it is clear that he refers to these three species, and in 1901 he describes them, though without saying which is the type of his section. *L. eriophthalmus* is here chosen as the type species because it seems, from the account given by Ceballos and Ortuno, Vegetacion y Flora Forestal de las Canarias Occidentales, Madrid 1951 p. 373, that this species is likely to survive longest in the wild state, the other two being perhaps already extinct.

Key to subgenera and to species of subgenus Lotus

Style with a tooth a little below the tip; ovary glabrous or, more often, with a few hairs along the dorsal suture, occasionally strigulose all over

Subgenus A. **Pedrosia**

Style not toothed; ovary glabrous except in no. 17 . Subgenus B. **Lotus**

Leaflets 5, rarely 3, flowers in pedunculate, or rarely sessile, bracteate umbels, the bract and peduncle (sometimes very short) usually visible even when the umbel is 1-flowered:

Ovary glabrous:

Corolla a rich yellow or yellow with red markings; bracts usually 3-foliate; basal leaflets differently shaped from the distal leaflets:

Calyx teeth less than 1.5 times as long as the tube; flowers 1-3

1. *L. corniculatus*

Peduncle glabrous, rootstock woody . . . a var. *eremanthus*

Peduncle pilose, rootstock herbaceous β var. *majior*

Calyx teeth about twice as long as the tube . . 2. *L. palustris*?

Corolla rose, or cream or white with crimson markings; peduncle not glabrous:

Perennials (except sometimes no. 11) growing, when within the tropics, above 1200 m.; leaf rhachis not prolonged beyond insertion of lateral leaflets:

Leaf rhachis 4-7 mm. long, more than $\frac{1}{2}$ as long as basal leaflets, which are almost as broad as long, nearly symmetrical at the base and have a basal angle of over 100° , often nearly 180° ; bracts almost always 1-foliolate:

Bract at the top of the peduncle:

Leaflets glabrescent with a few long spreading hairs at the base and on the margins, plant drying a fresh yellowish green 3. *L. becquetii*

Leaflets pilose all over, plant drying a darker green

3a. *L. lebrunii*

Bract 2-25 mm. below the top of the peduncle; long spreading hairs on the margins and midribs but not on the surface of the leaflets 3b. *L. sp.* 'A'

Leaf rhachis usually under 4 mm. long, less than $\frac{1}{2}$ as long as the basal leaflets, which are usually much longer than broad and have a basal angle of less than 100° :

Calyx teeth less than 1.3 times as long as tube:

Bushy herbs; peduncles rarely over 4 cm. long; flowers often fewer than 5 per inflorescence; basal leaflets less than twice as long as wide; terminal leaflets rarely more than 2.5 times as long as wide; bracts nearly always 3-foliolate:

Some or all hairs laxly spreading, up to 1 or 1.5 mm. long; axillary glands small, often hard to detect; fruit up to 2.5 cm. long; drying a dark greyish green

4. *L. goetzei*

Hairs shorter, appressed; leaflets densely dotted above with minute, dark red, impressed spots; axillary glands large, black 5. *L. wildii*

Stems herbaceous, spreading or ascending from a woody rootstock; peduncle often over 4 cm. long; flowers rarely fewer than 5 per inflorescence; basal leaflets often more than twice as long as wide; terminal leaflets usually more than 3 times as long as wide:

Leaf rhachis 2-4 mm. long:

Basal leaflets much the same shape as the others, $\pm$ cuneate at the base, widest towards the top, usually rounded at the apex, the surface $\pm$ pubescent, usually without red dots above or these dots weak and blurred; calyx green or mottled with red, pubescent; inflorescences usually near the top of the shoot; bracts 1 or 1-3-foliate

6. *L. discolor*

Hairs $\pm$ appressed α ssp. *discolor*

Hairs dense, whitish, spreading . . . β ssp. *mollis*

Basal leaflets differently shaped from the others, $\pm$ asymmetric at the base; surface of leaflets rarely pubescent:

Inflorescences near the tops of the shoots; hairs $\pm$ appressed; calyx tube almost glabrous, red; leaves intensely red-dotted above; bracts 1-3-foliate 7. *L. m'arjaneus*

Inflorescences near the base of the shoots; hairs often brownish yellow, stiffly spreading, often rather sparse, those on the leaflets confined to midribs and margins; basal leaflets widest at or below the middle, all leaflets often very acute; bracts 1- or 1-3-foliate 8. *L. namulensis*

Leaf rachis almost suppressed, the 5 leaflets arising from one pulvinus; bract 1-foliate 9. *L. subdigitatus*

Calyx teeth more than 1.3 times as long as the tube; basal much like distal leaflets, more than twice as long as wide:

Style 3.3-4 mm. long; ovules c. 17; pod less than 3 times as long as calyx 10. *L. quinatus*

Bract usually 3-foliate; peduncle usually shorter than subtending leaf α var. *quinatus*

Bract usually 1-foliate; peduncle often longer than subtending leaf β var. *brachycarpus*

Style 4-5.5 mm. long; ovules c. 30; pod more than 3 times as long as calyx; peduncle much longer than subtending leaf 11. *L. lalanjensis*

Annuals growing below 1000 m.; leaf rhachis often prolonged c. 0.5 mm. beyond lateral leaflets

Peduncle up to about twice as long as subtending leaf:

Basal leaflets much the same shape as distal leaflets; fruiting calyx teeth about twice as long as tube; style 3-4 mm. long; mature pod up to 3.2 mm. wide, not torulose

12. *L. arabicus*

Basal leaflets much wider at the base than the distal leaflets;
fruiting calyx teeth about as long as tube; style 4-5 mm.
long; mature pod slender, under 2 mm. wide, torulose

13. *L. torulosus*

Peduncle much shorter than subtending leaf:

Pod 14-25 mm. long; ovules c. 18; seeds c. 15; style c. 2 mm.;
lower edge of keel curved through c. 90°

14. *L. glinoides*

Pod 7-11 mm. long; ovules c. 9; seeds 6-9; style c. 1.5 mm.;
lower edge of keel curved through c. 80°

15. *L. schimperi*

Pod up to 6 mm. long; ovules c. 6; seeds 3-4; style c. 2.5 mm.;
lower edge of keel curved through c. 50° . 16. *L. nubicus*

Ovary pubescent; corolla white and rose; style 4.5-5.5 mm. long

17. *L. hebecarpus*

Leaflets 3, 4 or 5, all springing from one point; flowers solitary in leaf
axils without any trace of peduncle or bract; pod less than twice as
long as calyx 18. *L. garcinii*

A. Subgenus *Pedrosia*

Represented by some two dozen species in the Azores, Madeira, Canary
and Cape Verde islands, Spain, Portugal, Morocco, West Coast of Africa as
far south as the Gambia and the Sahara as far east as the Soda mts. in
central Libya. *L. jacobaeus* L., *L. arenarius* Brot., *L. chazaliei* Boissieu, *L. jolyi*
Batt. and its var. *eriocarpus* Maire have been reported on the mainland of
Africa within the tropics.

B. Subgenus *Lotus*.

1. *L. corniculatus* L., Sp. Pl. 775 (1753).

var. *eremanthus* Chiov., Racc. Bot. Miss. Consol. Kenia 29 (1935).

L. schoelleri Schweinf., Bull. Herb. Boiss. 4, App. 2: 231 (1896).

L. corniculatus var. *alpinus* sensu Chiov., Ann. Ist. Bot. Rom. 8: 87 (1903),
409 (1908), non Schleich. ex DC. (1825), nec Boiss. (1872).

L. mearnsii De Wild., Pl. Bequaert. 3: 321 (1925), non Britton (1890).

L. friesiorum Harms, Not. Bot. Gart. Berl. 10: 78 (1927).

SUDAN REPUBLIC: Jebel Marra, *H. Lynes* 83, *Mrs. Steele* 15, etc.

ERITREA: *Schweinfurth* (1894) 382 isotype of *L. schoelleri*, *Pappi* 4124.

ETHIOPIA: *Quartin Dillon* s.n., *Wellby* (1899) s.n., *Gillet* 5466, *Pichi Sermolli* 2230, *Mooney*
4776, 5007.

KENYA: *Mearns* 811 BM isotype of *L. mearnsii* and of *L. corniculatus* var. *eremanthus*, *Fries* 2506
UPS type of *L. friesiorum*, etc.

TANGANYIKA: *Uhlig* 703 EA, *Peter* 48173, *Pole Evans & Erens* 927.

This plant, with its 1-2-, rarely 3-flowered inflorescences, small flowers
and short, glabrous or almost glabrous, peduncles, at first sight seems
specifically distinct from *L. corniculatus* as it is known in N.W. Europe.

However, when the whole bewildering range of forms usually included in
L. corniculatus in the mediterranean region is considered, it is hardly possible

to exclude the tropical African plant. Var. *eremanthus* seems especially close to ssp. *tenuis* (Kit.) Briq., though in its wider leaflets it resembles ssp. *corniculatus*. The type of *L. schoelleri* has very minute leaves, it is placed here on the assumption that it is a form of var. *eremanthus* dwarfed by a dry montane environment, but this view requires experimental confirmation.

Both Richard (1847) and Baker (1871) describe *L. corniculatus* in Ethiopia as much more variable than it seems in fact to be. Richard probably included *L. discolor* (*L. tigrensis*) in his concept of *L. corniculatus* and Baker, although he described a flowering specimen, *Schimper* (1863) s.n. as the type of his *L. tigrensis*, left a fruiting plant of this species, *Schimper* (1853) 1042 under *L. corniculatus*. The statements by Broun & Massey (1929) and Andrews (1952) that *L. corniculatus* in the Jebel Marra has umbels of '5 or more' or '4-9' flowers seem to be based on earlier works rather than on the specimens, since none of the specimens seen from Eritrea, Ethiopia or the Sudan has more than 3 flowers in the umbel. This represents a rather greater range of variation than that found in Kenya and Uganda whence only 1-2-flowered umbels have been seen.

β ssp. **major** (Scop.) Gams in Hegi, Ill. Flora Mittel-Europa 4: 3: 1370 (1923); Cufodontis (1955).

L. major Scop. Fl. Carn. ed. 2: 2: 86 (1772).

L. corniculatus var. *major* (Scop.) Brand (1898); Bak. (1926) non Ser. in DC. (1825).

N. ETHIOPIA: 1838, *Schimper* 794; 1862, *Schimper* 653.

Differs from var. *eremanthus* in its less woody rootstock, larger leaflets and weakly pilose stems. In Europe this plant may have up to 5 or 6 flowers in the umbel but in the Ethiopian specimens cited they are 1-3-flowered.

2. ***L. palustris*** Willd. in L., Sp. Pl. Ed. 4, 3: 2: 1394 (1803); Cufodontis (1955).

L. lamprocarpus Boiss., Diagn. 9: 33 (1849).

ERITREA: Saganeiti, 21 April 1892, *Schweinfurth* & *Riva* 1767.

This species requires further investigation. *Schweinfurth* & *Riva* 1767 in spite of its longer calyx lobes seems to be as close to the plants here treated as *L. corniculatus* var. *major* as it is to the typical form of *L. palustris* from the Aegean. The Kew specimen is probably a duplicate of *Schweinfurth* 1867 cited by *Schweinfurth* (1896) as *L. lamprocarpus* and referred to by Brand (1898) as monstrous, some of its bracts being 5-foliolate. Chiovenda (1903, 1908) cites several further specimens from Eritrea which have not been seen.

3. ***L. becquetii*** Boutique, Bull. J. Bot. Ét. Brux. 23: 234 (1953); Fl. Congo Belge 4: 303, fig. 20 d. (1953).

URUNDI: Muramvya, *Becquet* 902 BR holotype.

SUDAN REPUBLIC: Imatong Mts., *Myers* 11644, *Thomas* 1831.

UGANDA: Mt. Moroto, *Wilson* 269, *Bally* 10759.

KENYA: Rift Valley and Nyanza provinces 12 specimens.

This species is described in the Flore du Congo Belge from a single specimen. Now that some 16 further specimens are known it remains a clearly

defined and reasonably uniform entity, despite the evidence, discussed under *L. lebrunii*, that some introgression may take place with *L. goetzei*.

3A. *L. lebrunii* *Boutique*, Bull. J. Bot. Ét. Brux. 23: 233 (1953); Fl. Congo Belge 4: 302 fig. 20c (1953).

N.E. BELGIAN CONGO: Mahagi Port-Djuga, *Lebrun* 3870 BR holo, K isotype.

An unsatisfactory species whose type differs from *L. beccquetii* in little more than the indumentum of the leaflets. This type of indumentum is common in *L. goetzei*. *Gillett* 14900 from the Amaro Mts., S. Ethiopia, resembles the type of *L. lebrunii* but is a stouter stiffer greyer plant and thus more like *L. goetzei*. *Eggeling* 2396 and *Dale* U 224 EA from Mt. Moroto and *Thomas* 3297 from Mt. Morogole, N. Uganda have the broad basal leaflets of *L. lebrunii* but resemble *L. goetzei* in their shorter leaf rhachis and trifoliate bracts. More material is desirable but it seems probable that introgression occurs between *L. beccquetii* and *L. goetzei* and has produced the type of *L. lebrunii* as one of a number of hybrid forms.

3B. *L. sp. ? new 'A'*.

S. ETHIOPIA: Gughé highlands, Mt. Tola, c. 3000 m., on precipitous eastern face, sprawling over rocks; a large spreading plant, flowers purple-pink shading to white, Dec. 1948, *Hugh Scott* 160.

The leaves are similar in shape to those of *L. beccquetii* and *L. lebrunii*. Their hairs are stiff and spreading and confined to the margins of the leaflets and the midribs as in *beccquetii* but they are more numerous and the whole plant is unusually luxuriant and stout, the leaflets up to 19 mm. long instead of 13 mm. as in *beccquetii* and the main stems c. 3 mm. in diameter instead of 1 mm. The bracts are 1-foliate as in *beccquetii* but are placed well below the top of the peduncle in almost all cases. If this feature were constant, it and the other characters mentioned might justify describing this plant as a new species. However on one or two unusually slender branches the bracts are in the normal place at the top of the peduncle, and bracts placed below the top have been seen sporadically in two other species of *Lotus*. It therefore seems advisable to await further material before deciding on the status of this interesting plant.

4. *L. goetzei* *Harms*, Eng. Bot. Jahrb. 30: 324 (1901).

L. discolor var. *microcarpus* Brand, Eng. Bot. Jahrb. 25: 214 (1898).

L. kilimanjariensis Bak. f., Leg. Tr. Afr. 87 (1926).

L. nyikensis Bak. f., ibid. 89 (1926).

L. jaegeri Harms, Not. Bot. Gart. Berl. 10: 79 (1927).

L. oehleri Harms, ibid.

ETHIOPIA: Wasit, Shoa, c. 39° 48' E., 9° 45' N., *Mooney* 6451, 6975; *Mega*, *Gillett* 14321.

UGANDA: Mt. Moroto, *Philip* 761; *Elgon*, *Thomas* 2691.

KENYA: Mt. Nyiro, Endoto Mts., *Elgon*, *Longonot*, *Aberdares*, Mt. Kenya.

TANGANYIKA: Lemagrut near Ngorongoro (*Jaeger* 422 B, type of *L. oehleri*); Kilimanjaro, *Volkens* 1487 (B holo.) K, BM isotype of *L. discolor* var. *microcarpus* and *L. kilimanjariensis*; Mporoto mts., *Goetze* 1044 (B, holo.) K isotype.

NYASALAND: Nyika plateau, *Crawshaw* s.n. BM, type of *L. nyikensis*, *Brass* 17217.

This species varies greatly in the size and shape of the leaflets, the amount of indumentum, the length of the peduncle and the number of flowers in the inflorescence. *L. goetzei* is closely related to *L. discolor* and intermediate forms occur, such as the type of *L. oehleri*, in which the peduncles are much longer than usual and the type of *L. kilimnjaricus* in which the hairs are short and appressed. The type of *L. jaegeri*, and Burt 4037 and Geilinger 3385, the only specimens seen from Mt. Hanang, all have an unusually dense indumentum on the leaflets. The type, Goetze 1044, and other plants from the same area, such as *St. Clair Thomson* 804, have a rather sparse but long indumentum, and unusually wide and angular basal leaflets, showing some approach to *L. namulensis*. Besides these at least one other well marked form of the species exists. It seems desirable that further material should be obtained and, if possible, experiments carried out on the relation of these characters to environmental factors before intraspecific taxa are described.

5. *L. wildii* Gillett sp. nov.

H. discolori E. Mey. affinis; habitu suffruticoso, foliolis parvis, glandulis axillaribus bene distinctis differt.

Radix haud visa. Herba suffruticosa c. 0.5 m. alta vel, inter fruticos, ad 1.5 m. ascendens. Caules erecti, breviter, appresse et sat dense pubescentes, pilis ad 0.5 mm. longis; internodiis brevibus (ad 2 cm. longis). Rhachis folii c. 2 mm. longa, glande axillari atro-rubro pulviniforme bene distincto; foliola terminalia cuneato-oblanccolata, basalia $\pm$ oblonga, alia haud breviora, omnia apice rotundata, apiculata, utrinque appresse pubescentia, ad 9 [13] mm. longa et 4 [8] mm. lata. Umbelli 3-6 [-7]-flori; pedunculis ad 4 [5] cm. longis; bracteis, 3-foliolatis, foliis similibus sed brevioribus; glandibus inter et circa pedicellos bene distinctis; pedicellis c. 2.5 mm. longis. Calycis tubus infra insertionem staminum c. 1 mm., supra eandem 2 mm. longus; dentes triangulari-acuminati, c. 2 mm. longi, duo superiores aliis paulo maiores. Vexillum oblongum, basin cuneatum, c. 8 mm. longum et 4 mm. latum. Alarum unguiculi curvati, c. 3 mm. longi; laminae paulo saccatae suboblongae, c. 6 mm. longae, 4 mm. latae. Carina in toto 8 mm. longo, apice subrostrata. Filamentorum pars connata 5 mm. longa, partes liberae 1.5-2 mm. longae; antherae 0.5 mm. longae. Ovarium 4.5 mm. longum, c. 24-ovulatum, stylo paulo curvato 3.5 mm. longo, stigmate terminale, minute globoso. Legumen interne septatum, rectum, c. 2 cm. longum et 2 mm. latum. [Semina c. 8, atro-viridia, lentiformia, c. 1.3 mm. diametro.]

PORT. E. AFRICA: Manica e Sofala, Summit of Mt. Gorongosa, c. 34° 5' E., 18° 25' S., c. 1800 m., in grassland, branching perennial herb, 26.9.1943, A. R. Torre 5944 K, BM.

S. RHODESIA: **Inyanga district:** Mtenderere source, 2100 m., grassy slopes, bushy perennial 35 cm. tall, corolla white with pink markings, 5.9.1954, *H. Wild* 4590, holotype; Rhodes estate, plateau on summit of Inyangani, 600 m. N. of beacon, 2500 m., herb 50 cm. tall, corolla white and purple, 25.5.1954, *N. C. Chase* 5249, K, BM; 5 km. N. of Troutbeck inn, 1950 m., in grass, 50 cm. tall, corolla white and purple, 22.4.1953, *N. C. Chase* 4925, SRGH, BM; standard pinkish, rest of corolla pale yellow, May 1950, *D. L. Garley* 5, SRGH; Foot of Inyangani 1950 m., procumbent at forest edge, corolla white, the keel red-tipped, 25.10.1946, *H. Wild* SRGH; Ascent of Inyangani via west face, 2340 m., twiggy herb, flowers whitish, frequent in grassland, 9.6.1957, *Goodier & Phipps* 65.

Umtali District: Stapleford, Mt. Naza, scrambler, stems up to 3m., corolla white with purple stripes, 25.6.1934, *H. B. Gilliland* 491, SRGH, BM; S. of Penhalonga, *Acacia* veldt, corolla white, Oct. 1934, *Gilliland* 929 BM; probably same area, *Gilliland* K729.

Melsetter district: Chimanimani Mts., 1500 m., in Kloof, scrambling bushy perennial up to 1.5 m., corolla white tinged with pink, keel purple-tipped, 9.6.1949, *Wild* 2975.

Though closely related to *L. discolor* E. Mey. this plant differs consistently in several small characters and occupies a well defined geographic area. Taking into account the fineness of the specific distinctions commonly accepted in *Lotus* in Africa it seems proper to treat it as a species.

6. ***L. discolor*** E. Mey, Comm. Pl. Afr. Austr. 92 (1835); Fl. Congo Belge 4: 302, fig. 20 a, b (1953).

α* ssp. *discolor

L. tigrensis Bak., Fl. Trop. Afr. 2: 61 (1871).

L. brandianus Harms, Eng. Bot. Jahrb. 28: 401 (1900).

L. discolor var. *cacondensis* Hiern ex Bak. f., Leg. Trop. Afr. 878 (1930).

BRITISH CAMEROONS: Bamenda; FRENCH CAMEROONS: *Jacques Felix* 2720; BELGIAN CONGO: Eastern districts; ETHIOPIA: *Schimper* (1863-8) s.n. type of *L. tigrensis*, etc.; UGANDA: South Western districts; KENYA: Chyulu hills; TANGANYIKA: Bukoba, Moshi, Lushoto, Ufipa districts, Nguru mts., S. highland province, *Goetze* 740 (B. holo.), BR, isotype of *L. brandianus*; NYASALAND: Nyika and Zomba plateaux; N. RHODESIA: Nyika plateau; ANGOLA: Caconda, *Anchieta* 32, BM, type of var. *cacondensis*; TRANSVAAL: NATAL: *Drège* s.n. isotype; EASTERN CAPE PROVINCE.

Anchieta 32 is the only specimen seen from Angola. It differs somewhat in aspect from other specimens of *L. discolor* but it seems advisable to study a number of Angolan specimens before recognising the variety described by E. G. Baker. The young fruit is glabrous, as in all other specimens of subgenus *Lotus* which have been examined, except *L. hebecarpus*, and not minutely pubescent as stated by E. G. Baker.

β* ssp. *mollis Gillett ssp. nov.

A ssp. *discolore* pilis mollibus patentibus satis densibus caulium, foliorum inflorescentiarumque differt.

S. RHODESIA: **Umtali district:** Himalayas, Engwa farm, 1950 m., in open grassland, rootstock perennial, corolla yellowish with purple-tipped keel and pinkish calyx, 9 Nov. 1954, *H. Wild* 4632, K, holo., SRGH, isotype; same area, 1800 m., 2 Nov. 1953, *Bates in SRGH* 44259. Vumba mts., grassland, 40 cm. tall, flower cream, 30 Oct., 1950, *N. C. Chase* 3107 K, BM. Imbesa valley, 1050 m., in grassland, 29 Oct. 1954, *N. C. Chase* 5316, K, BM.

Melsetter district: Oct. 1919, *Walters in Agric. Dept.* 2722; Nov. 1919, *Walters in Eyles* 2063. Martin Forest reserve, Rocklands, 1350 m., herb to 50 cm., corolla pale yellow, 14 Oct. 1950, *N. C. Chase* 2920, K, BM; Sept. 1953, *Williams* 121.

This subspecies seems to differ from ssp. *discolor* in the indumentum only. The hairs, though spreading, do not stand stiffly erect, at right angles to the epidermis as in *L. namulensis*.

7. ***L. mlanjeanus*** Gillett nom. nov.

Crotalaria minor Wright, Kew Bull. 1901: 121 (1901).

Lotus minor (Wright) Bak. f., Leg. Trop. Afr. 89 (1926), non Bishop (1826) nec L. M. Chav. (1884).

L. discolor sensu Brenan, Mem. N. Y. Bot. Gdn. 8: 248 (1953), p.p., non E. Mey.

A weak straggling herb, the inflorescences borne near the ends of the shoots. Indumentum on all parts of the plant sparser than in any other

Tropical African species of *Lotus*, except *L. corniculatus* var. *eremanthus*. In particular the calyx is almost glabrous outside and the leaflets are almost glabrous except for the midrib beneath: what hairs do exist are short and usually more or less appressed. The leaflets are cuneate with recurved margins, the basal pair are usually much shorter than the others and somewhat lozenge-shaped or rhomboidal. There is much red pigmentation, especially on the calyx.

NYASALAND: Mt. Mlanje, 1891, *A. Whyte* s.n., 80 BM, 142 BM; 5 Nov. 1898, *Mahon* s.n. holotype; May 1901, *J. M. Furnes* 16; 1919, *Mrs. Shinn* s.n. BM; Oct. 1939, *Forbes* 28 EA; Oct. 1941, *Greenway* 6292; June–July 1946, *Brass* 16400, 16647, 16791; Dec. 1947, *Lupton* 93, BM; July 1956, *G. Jackson* 1875; Aug. 1956, *Newman & Whitmore* 52 BM, 385 BM; May 1957, *Goodier* 293; June 1957, *Chapman* 463 K, BM, SRGH.

Brenan (1953) argues in favour of treating this plant simply as *L. discolor*. However the fact that all 17 gatherings of *Lotus* so far made on the isolated Mt. Mlanje differ from the rest of the genus in the definite though slight characters mentioned above seems to demand taxonomic recognition of some kind, which can best be given, for reasons explained under *L. wildii*, by retaining the specific rank of this taxon.

8. *L. namulensis* Brand, Eng. Bot. Jahrb. 25: 213 (1898).

L. eylesii Bak. f., J. Bot. 73: 294 (1935).

PORT. E. AFRICA: Namuli, c. 37° 5' E., 15° 30' S., *Last* s.n. (B, holo.) K, isotype.

S. RHODESIA: **Inyanga district:** Inyanga, 2100 m., Oct. 1946, *Rattray* 876 SRGH, *Wild* 1361, *Sturgeon* in SRGH 16964 SRGH; Nyangani, Nov. 1949, *N. C. Chase* 1844 BM, SRGH; Pungwe hills, Nov. 1942, *Hopkins* in SRGH 9425 SRGH, c. 2000 m., Nov. 1945, *Hopkins* in SRGH 13824; Mutsinga farm, 1800 m., Oct. 1956, *Miller* 3820; Rhodes estate, Nov. 1931, *Brain* 7367 SRGH; Gairesi ranch, 10 Km. N. of Troutbeck, 2160 m., *Robinson* 1886.

Umtali district: Stapleford 1650 m., *Eyles* 6379, type of *L. eylesii*; Mt. Nuza, June 1934, *Gilliland* 548; Stapleford, *Gilliland* 852; vumba mts., Oct. 1950, *Chase* 3106 SRGH; Hima-layas, Engwa, 1950 m., Nov. 1954, *Wild* 4631.

Melsetter district: 1800 m., Oct. 1908, *Swynnerton* 6179 BM; 'Skyline' estate, 28 Km. W. of Melsetter, Nov. 1950, *Crook* M 271 SRGH; pasture research substation, 1920 m., Oct. 1953, *Williams* 180.

N. TRANSVAAL: Zoutpansberg, Entabeni, Aug. 1930, *Hutchinson & Gillett* 4233.

This species approaches *L. discolor*, especially ssp. *mollis*, on the one hand and *L. goetzei* on the other. There is a good deal of variation in the shape of the leaflets; in some forms these are very acute, in others, such as the type, more or less rounded at the tip. The species always seems to flower near the ground on short shoots springing from massive woody rootstocks after grass fires. It might be considered to be a form of *L. goetzei* due to such conditions, were it not for the fact that it has not been seen from the areas where the shrubby *L. goetzei* is known. It would be interesting to know how plants of *L. namulensis* develop if grass fires are excluded.

8a. *L. oxyphyllus* Harms., Eng. Bot. Jahrb. 30: 325 (1901).

TANGANYIKA: Njombe district, Kipengere range, c. 2700 m., dry slopes with scattered boulders, May 1899 (*Goetze* 972 B, type).

In the absence of specimens it is impossible to place this plant. On the one hand it would seem to be very close to certain forms of *L. namulensis*, a species otherwise unknown from Tanganyika, on the other hand it could be a form of *L. goetzei*.

9. *L. subdigitatus* Boutique, Bull. J. Bot. et Brux. 23: 234 (1953); Fl. Congo Belge 4: 304 fig. 20 b (1954).

BELGIAN CONGO: near Lusinga, c. 27° 10' E., 8° 55' S., *De Witte* 2502, 3482, BR holo.!

TANGANYIKA: Kigoma district: 57 km. S. of Uvinsa, c. 30° 20' E., 5° 30' S., *Bullock* 3296.

Bullock 3296 is assigned to this species with some doubt: it agrees in the indumentum, the massive woody rootstock and the suppression of the leaf-rhachis, but differs in the inflorescence being near the base of the shoots instead of near their tips, in its rather narrower basal leaflets and in its calyx lobes being about as long as the tube instead of $\frac{1}{3}$ of its length.

10. *L. quinatus* (Forsk.) Gillett comb. nov.

α var. *quinatus*.

Ononis quinata Forsk., Fl. Aeg. Arab. 130 (1775).

Lotus brachycarpus Hochst. & Steud. ex A. Rich. var. *menachensis* Schweinf., Bull. Herb. Boiss. 4, App. 2. 23 (1896).

Dorycnium quinatum (Forsk.) C. Christ., Dansk. Bot. Ark. 4: 3: 24 (1922).

YEMEN: Chadra, c. 44° E., 14° N., *Forskahl* s.n. BM, isotype. Hadnan Botta s.n. Menacha, Jebel Schibam, 21 Feb. 1889, *Schweinfurth* 1516, isotype of var. *menachensis*.

BRIT. SOMALILAND: Surud Range, Shimba Beris, 47° 12' E., 10° 45' N., *Collenette* 386. Ragad, 48° 30' E., 10° 45' N., *Newbould* 888.

S. ETHIOPIA: reported by Harms (1897) from between Rogono and Gobo Duaya, c. 38° 5' E., 5° 32' N., *Riva* 172 (not seen).

β var. *brachycarpus* (Hochst. & Steud. ex A. Rich.) Gillett comb. nov.

L. brachycarpus Hochst. & Steud. ex A. Rich. (1847).

Dorycnium schimperii Jaub. & Spach, Ill. Pl. Or. t. 473 (1856).

[*L. arabicus* sensu Engler (1892) p.p. non L.]

ERITREA: Halaï, May 1894, *Schweinfurth* 226; Saganciti, March 1892, *Schweinfurth* & *Riva* 803/A.

ETHIOPIA: Dungara-Go, Dec. 1837, *Schimper* 242, K, isotype of *L. brachycarpus* and *D. schimperii*; 1853, *Schimper* 19; 1862, *Schimper* 650 and 654; *Quartin Dillon* s.n. and 295; *Parkyn* s.n.

Var. *brachycarpus* differs from var. *quinatus* in its nearly always 1-foliolate bracts, longer peduncles and longer calyx lobes. It also has laxer more herbaceous stems.

γ var. *montanus* (A. Rich.) Gillett comb. nov.

L. montanus A. Rich. (1847) non sensu Andrews (1952).

L. nubicus var. *montanus* (A. Rich.) Bak. (1871).

L. brachycarpus var. *montanus* (A. Rich.) Cufod. (1955).

ETHIOPIA: (Anton Petit s.n. P., holotype), *Quartin Dillon* s.n.

The short fruits ($\frac{1}{3}$ longer than the calyx) show that this plant is related to var. *brachycarpus* more closely than to *L. lalambensis* with which Dr. Cufodontis united it. By what must have been a *lapsus calami* Dr. Cufodontis designates *Schweinfurth* 861 and 1520, the syntypes of *L. lalambensis*, as the syntypes of var. *montanus* (A. Rich.) Cufod. This is clearly impossible as these plants were not collected till some 40 years after Richard published his *L. montanus*. This plant may be but a stunted form of var. *brachycarpus*, it requires further study when more material is available.

11. *L. lalambensis* Schwnfth., Bull. Herb. Boiss. 4, App. 2: 235 (1896).

L. arabicus L. var. *glabrescens* Schwnfth., ibid. 234.

? *L. brachycarpus* Hochst. & Steud. ex A. Rich. var. *cuscutae* Schwnfth. ibid.

233.

? *L. hebranicus* Hochst. ex Brand (1898).

? *L. brachycarpus* var. *major* Brand (1898).

L. brachycarpus var. *lalambensis* (Schwnfth.) Brand (1898).

[*L. arabicus* sensu Engler (1892) p.p. non L.]

ERITREA: Ambelaco, Feb. 1894, *Schweinfurth* 323 (cited as 232 by Schweinfurth as var. *glabrescens* and by Brand as *L. hebranicus*). Montilesa, *Pappi* 4680 (cited by Chiovenda (1903) as *L. brachycarpus*). Mt. Bizen, May 1892, *Schweinfurth* 1849 (cited by Schweinfurth as var. *glabrescens*, by Brand as *L. brachycarpus*). Geleb *unknown collector* ex Damman & Co., Bogos, 1861, *Steudner* 39 (cited by Engler 1892 as *L. arabicus*). Nefasit, *Colville* 76.

ETHIOPIA: Aubarre, *Hummel* 27 EA. Harar-Diredawa, near Haramaia, *Bally* 11640.

The specimen from Geleb, supplied by Dammann & Co. in 1893 as *L. lalambensis* is probably isotypic, as the type *Schweinfurth* (1891) 1520 is from this locality and Schweinfurth is known to have obtained ripe seed. It is difficult to see how the firm could have obtained the name before its publication except from its author. This specimen agrees with the descriptions of the type and of var. *cuscutae* in having a spreading indumentum, while that of specimens cited as var. *glabrescens* and *L. hebranicus* is scantier and more appressed.

L. lalambensis occupies an intermediate position between *L. arabicus* and *L. quinatus* var. *brachycarpus*, with each of which it has been compared, the three taxa differ as follows:

Character	A <i>L. arabicus</i>	B <i>L. lalambensis</i>	C <i>L. quinatus</i> var. <i>brachycarpus</i>
Duration.	Annual.	Short lived perennial or annual.	Perennial.
Whether leaf rachis prolonged beyond lateral leaflets or not.	Usually prolonged.	Rarely slightly prolonged.	Not prolonged.
Width of leaflet as percentage of length.	40-60%	20-40%	20-40%
Length of peduncle as compared to subtending leaf.	1-2 or, rarely, 2-5 times as long.	Up to 3 times as long.	Up to 3 times as long.
No. of flowers in umbel.	1-3, rarely up to 5.	Up to 7, all plants with some umbels more than 3-flowered.	As in B.
Length of filament sheath.	c. 4 mm.	c. 5 mm.	c. 4 mm.
Length of style	3-4 mm.	4-5.5 mm.	3.3-4 mm.
No. of ovules	c. 22	28-32	17-18
Pod length as multiple of calyx length	Over 4.	Over 4.	Up to 2 or 3.

12. *L. arabicus* L., Mant. 1: 104 (1767); Bak. (1871); Bak. f. (1926) non sensu Engler (1892).

L. roseus Forsk., Fl. Aeg. Arab. 140 (1775).

L. mossamedensis Welw. ex Bak. (1871):

[*L. glinoides* sensu Bak. (1871) non Del.]

EGYPT: (A plant grown from seed supplied to Linnaeus by Forskal—holotype). *Forskahl* s.n., BM, isotype of *L. roseus*. ARABIA: BALUCHISTAN: SENEGAL: GAMBIA: FR. SUDAN: N. NIGERIA: SUDAN REPUBLIC: ERITREA AND ETHIOPIA fide Cufodontis (1955). TANGANYIKA: PORT. E. AFRICA: S. RHODESIA: ANGOLA: Benguela, Bero River, *Welwitsch* 1899, isotype of *L. mossamedensis*: N. TRANSVAAL.

Kotschy 211 from the Sudan republic, described by Baker (1871) as *L. glinoides* is a form of *L. arabicus* in which the peduncles are shorter than usual and crowded among the leaves at the ends of the branches. It is at once distinguishable from the true *glinoides* by the larger flowers and longer peduncles. It appears that this type of plant may be produced when *L. arabicus* exceptionally survives its first season.

13. *L. torulosus* (*Chiov.*) *Fiori*, N. Giorn. Bot. It. n.s. 19: 451 (1912).

L. arabicus var. *torulosus* *Chiov.* (1903).

SUDAN REPUBLIC: Red Sea Coast, Arkiko (probably Aqiq, c. 18° 14' N.), 1869, *J. K. Lord* s.n. Tagdaya hill, 18° 14' N., March 1949, *Bally* 6964.

ERITREA: (*Pappi* 39 FI, 64 FI, 1735 FI., 4227 FI, *Scotti* s.n. FI syntypes) *Pappi* 4800. *Bally* 6834.

14. *L. glinoides* Del., Ann. Sci. Nat. 2nd ser. 7: 286 (1837); Boissier (1872); Tackholm (1956) partly, excl. syn. Not of Bak. (1871) nor Andrews (1952) nor Cufodontis (1955).

L. trigonelloides Webb, in Webb and Berthelot, Hist. Nat. des Canaries part 3, Phytog. t. 65 (11 Oct. 1837).

L. arabicus L. var. β *trigonelloides* (Webb) Webb, *ibid*, Phytog. 2: 87 (1842) non sensu Balfour f. (1888).

CANARY ISLANDS: Lancerottae island, *Webb* s.n. (FI holo.) K isotype of *L. trigonelloides* and many other specimens.

MOROCCO: Oasis d'Akka, *Beaumier* in *Cosson* s.n.

LIBYA: Wadi Tangesir, *Guichard* Lib. 127 BM.

EGYPT: near El Tor, *Bové* (P holo.) K isotype, and other specimens.

SINAI: *J. K. Lord* s.n.

CENTRAL SAHARA: Hagggar mts., Oued Tamanrasset, *Meinertzhagen* 37.

Boissier (1872), Brand (1898) and Cufodontis (1955) maintain that *L. trigonelloides* is a species distinct from *L. glinoides* but only Brand gives evidence for this view. However the characters which he mentions do not hold good when a number of plants from each area are examined. Luxuriant plants with peduncles up to 4 or 5 mm. long occur both in the Canary isles and Egypt and the calyx teeth are about as long as the tube in each area. The reason for Brand's statement that in *L. trigonelloides* they are 'tubo multo brevioribus' is obscure since all specimens from the Canaries, and Webb's plate of *L. trigonelloides* show them to be about as long as the tube. The date of publication of *L. trigonelloides* is given by W. T. Stearn (1937) as 11 Oct. 1837; it is almost certain that the date of publication of *L. glinoides* is earlier since both vol. 7 and vol. 8 of Ann. Sci. Nat. are said to have appeared in 1837.

15. *L. schimperi* Steud., Nom. 2nd. ed. 2: 75 (1841) (nomen nudum), ex Boiss. Fl. Or. 2: 170 (1872); Vierhapper (1907); Schwarz (1939).

[*L. arabicus* var. β *trigonoloides* sensu Balf. f. (1888), non (Webb) Webb].

[*L. glinoides* auct. p.p. non Del.]

EGYPT: Red Sea Coast, 22° 38' N., 7 March 1933, *Shabetai* s.n.

HEJAZ: Near Jeddah, 1837, *Schimper* 844 K isoelectotype BM; *Fischer* 139; *Zohrab* 116, 138; *Ehrenberg* s.n.; *Trott* 58, 1374, 1524.

COASTS OF PERSIAN GULF: Bahrein, *Good* 76; Hormus island, *Bornmueller* 283; Kischm Island, *Bornmueller* 281; locality unspecified, *Pilgrim* s.n., *Floyer* 55, 58.

SUDAN REPUBLIC: Red Sea Province, 21° N., *Bent* s.n.; Dongonab, *Crossland in Sudan* *gout. herb.* 1552; Arkiko (?Aqiq, 18° 14' N.) *J. K. Lord* s.n.

ERITREA: fide *Cufodontis* (1955).

ABD EL KURI: reported by Vierhapper.

SOCOTRA: *Balfour* 669.

L. schimperi has been treated as conspecific with *L. glinoides* by Brand (1898), E. G. Baker (1926), *Cufodontis* (1955) and *Tackholm* (1956) while the opposite point of view, that it is a distinct species, has been upheld by Boissier, Vierhapper and Schwartz. In view of this persistent controversy the differences between the two taxa (excluding, for the moment, *Schweinfurth* 1906, the type of *L. ehrenbergii* *Schweinfurth* ex Vierhapper) are set out below.

Character	A <i>L. glinoides</i>	B <i>L. schimperi</i>
Length of peduncle ...	0.5 mm.	0.1 mm.
No. of flowers in umbel ...	1-2, rarely 3 or 4	2-4, rarely 1 or 5-6
Angle through which lower edge of keel is curved ...	c. 90°	c. 80°
No. of ovules ...	c. 18	c. 9
Length of style ...	c. 2 mm.	c. 1.5 mm.
Length of better developed pods on each plant	14-20, rarely up to 25 mm.	7-9, rarely up to 11 mm.
No. of seeds ...	c. 15	6-7 rarely 8 or 9.

It is clear that, in spite of the overlapping of some of these characters, there are sufficient grounds for treating *glinoides* and *schimperi* as distinct species. Much confusion seems to have arisen because botanists have considered *Schweinfurth* 1906 as typical *L. schimperi*. As has been argued elsewhere (*Bullock and Gillett, nomenclatural notes IX, Kew Bull.* 1958: 255.) *Schimper* 844 is the best choice of lectotype for *L. schimperi*; *Schweinfurth* 1906, collected on 2 April 1864 between Kosseir and Ras Benass on the Egyptian Red Sea coast, i.e. at the place where the known ranges of *L. glinoides* and *L. schimperi* approach most closely, appears to be far from uniform. Thus Vierhapper (1907) describing, presumably, the Vienna sheet of this number, and incidentally validating *Schweinfurth's* m.s. name *ehrenbergii*, states that the keel is less sharply bent than that of *L. schimperi* and the pods longer than those of either *glinoides* or *schimperi*: the Kew sheet however shows the keel



Distribution of 3 closely related vicarious species of *Lotus*: ▲ *L. glinoides*, ● *L. schimperi*, ■ *L. nubicus*, X "*L. ehrenbergii*"—a population of presumed hybrid origin between *L. glinoides* and *L. schimperi*.

bent through 90° as in *L. glinoides* and pods up to 13 and 15 mm. long. Boissier describes the pods as 12 mm. long. It would seem, therefore, that Schweinfurth 1906 probably represents neither typical *L. schimperi*, nor a distinct species, but a hybrid population between *L. glinoides* and *L. schimperi*.

16. *L. nubicus* Hochst. ex Bak., Fl. Trop. Afr. 2: 62 (1871).

SUDAN REPUBLIC: Mt. Mussa, W. of White Nile, c. 15° N., 10 Jan. 1841, Kotschy 311, K holotype, BM iso. Getena (El Geteina), E. bank of White Nile, c. $14^\circ 50'$ N., 7 Jan. 1869, Schweinfurth 900, K, BM.

As Cufodontis (1955) points out, this species is totally distinct from *L. montanus* A. Rich., (*L. brachycarpus* var. *montanus* (A. Rich.) Cufod.) which was treated as a variety of *L. nubicus* by Baker (1871) and Baker f. (1926) and as synonymous with it by Andrews (1952). *L. nubicus* is an annual with the leaf rhachis well developed and prolonged slightly beyond the lateral leaflets, peduncle less than half as long as the subtending leaf and a style c. 2.5 mm. long. *L. montanus* is perennial with the leaf rhachis almost completely suppressed, a peduncle more than twice as long as the subtending leaf and a style c. 3.9 mm. long. *L. nubicus* has a keel bent through c. 50° , a staminal sheath c. 2.5 mm. long and a very short ovary with c. 6 ovules: it seems to have a restricted distribution in a subdesert region of the Sudan and it is likely that Rosen s.n. from an altitude of 2300 m. in central Ethiopia, identified by Pax (1907) as *L. nubicus*, was in fact *L. brachycarpus* var. *montanus*.

17. *L. hebecarpus* Gillett sp. nov.

'*L. sp. near L. ehrenbergii* Schwfth.' Broun & Massey, Flora of the Sudan 182 (1929).

Species *L. arabico* affinis. Ab congeneribus omnibus in subgenere *Loto* ovario fructuque piloso insigniter differt.

Herba annua, vel forsán interdum perennis, ramis pilosis procumbentibus tenuibus, ad 40 cm. longis et 1.3 mm. diametro. Folia utrinque, sed saepius haud dense, pilosa, glande axillari parvo, rhache 1–4 mm. longa, saepius ultra foliola lateralia paulo prolongata, foliolis basalibus inaequaliter

ovatis, ad 5 mm. longis et 3.5 mm. latis, foliolus terminalibus oblanceolatis vel cuneato obovatis, ad 11 mm. longis et 5 mm. latis, apice rotundatis. Umbelli 1-3 [-5]-flori, pedunculo dense piloso 3-14 mm. longo, quam folio subtendente brevior vel ad duplo longior; bractea elliptica 1-, vel rarius 2-3-foliolata; pedicelli glandibus parvis interspersi, glabri vel sparse pilosi, c. 1 mm. longi. Calycis tubus infra insertionem staminum 1.5 mm., supra eandem 2 mm. longus, inferne fere glaber, superne pilosus, pilis ad 1 mm. longis; lobi lineari-acuminati, pilosi, c. 4.5 mm. longi, duo superiores alii paulo latiores. Corolla intense rosea; vexillum c. 10 mm. longum et 6 mm. latum. Ala 10 mm. longa, ungue 3 mm. longo inclusio. Carina 10 mm. longa ungue rostroque quoque 3 mm. longo inclusis. Filamentum pars connata c. 5 mm., partes liberae c. 2 et c. 4 mm. longae. Ovarium 1 mm. stipitatum, 5 mm. longum, basin sparse, apicem versus dense, pilosum, pilis $\pm$ patentibus c. 0.7 mm. longis, c. 30-ovulatum. Stylus glaber, paulo curvatus, 4.5-5.5 mm. longus. [Legumen rectum, basin glabrescens, apicem versus pilosum, ad 24 mm. longum et 2 mm. latum, c. 14-spermum].

SUDAN REPUBLIC: Red Sea hills, Erkowit, 14 May 1907, *Broun* 1161. *Ibid.*, 1927, *Lady Maffey* s.n. *Ibid.*, 1200 m., corolla red and pink, 3 March 1932, *G. Aylmer* 224. *Ibid.* (Khor Telalaib) sandy soil, fairly common, eaten by goats and sheep, vern. name HAYA, *Andrews* 3464. *Ibid.* (Jebel um Batab) in valleys and among rocks, fairly common, eaten by goats and sheep, vern. name OWSYAM, *Andrews* 3569. *Ibid.*, trailing herb, corolla brilliant crimson, abundant, 27 March 1953, *J. K. Jackson* 2729, type. Slopes near Port Sudan, 23 Jan. 1912, *MacDougal & Sykes* 100 BM.

ERITREA: Wadi Asserai, coastal plains near Sudan border, 60 m., on gravelly soil and in *Pennisetum* cultivation, 27 March 1949, *Bally* 6887.

FRENCH SOMALILAND: 'Red Sea between 11° and 12° N. Lat., c. 1869, *J. K. Lord* s.n. [Although these latitudes are strictly speaking, south of the Red Sea, a letter from Lord preserved at Kew makes it clear that he collected from Berenice in Egypt to 'Zala' (presumably Zeila in British Somaliland, c. 11°N.), on the coast and hills near the coast, calling the whole area the western coast of the Red Sea].

Broun & Massey (1929) compared their specimens of the present species with *L. ehrenbergii*. As has been explained under *L. schimperii*, *L. ehrenbergii* represents a population intermediate between *L. schimperii* and *L. glinoides*. All forms of these species differ from *L. hebecarpus* in their umbels sessile or on peduncles not over 5 mm. long, their smaller flowers with styles hardly exceeding 2 mm. in length and their narrower, glabrous, fruit. *L. hebecarpus* is actually closer to *L. arabicus* which, however, has stouter stems, larger leaflets, the basal ones less different in shape from the terminal, glabrous pods over 3 mm. wide when mature and a style 3-4 mm. long. *L. hebecarpus*, especially specimens from the coastal plain such as *MacDougal & Sykes* 100 and *Bally* 6887, is even more closely related to *L. torulosus*, from which it differs in its pubescent non torulose pods, denser indumentum and rather longer calyx lobes.

Although most published accounts of the genus do not mention the point the ovary and fruit of *Lotus* are usually glabrous, as the corolla always is. *Brand* (1898) p. 194 states that all species have completely glabrous fruits except *L. loweanus* Webb. He sinks *L. trichocarpus* Lag., described by Lagasca as having pubescent fruits, in the glabrous-fruited *L. coimbrensis* Willd. without explanation. While dealing with the indumentum of the fruit in this way *Brand* does not mention that of the ovary which is perhaps more fundamental though more difficult to observe. A search through the Kew herbarium and the principal literature supports *Brand's* generalisation so far as subgenus *Edentolotus* *Brand* (subgenus *Lotus* by the present rules of nomen-

clature) is concerned: apart from the present species not a single specimen of subgenus **Lotus** has been seen in which the ovary is not completely glabrous. The position is very different in subgenus **Pedrosia** to which *L. loweanus* belongs. Not only has *L. jolyi* Batt. var. *eriocarpus* Maire, Bull. Soc. Hist. Nat. Afr. N. 26: 201 (1935) been described since Brand wrote but *L. assakensis* Loss. ex Brand has pubescent-ovaries, while many, perhaps most, of the species in this subgenus have long hairs on the dorsal suture of the ovary especially near the tip. The frequency of nonglabrous ovaries in subgenus **Pedrosia** contrasted with their extreme rarity in subgenus **Lotus** may be taken as support for Brand's opinion, opposed to that of Benthams (1865) and Taubert (1894), that **Pedrosia** is an important natural taxon. The majority, perhaps 80%, of the species of **Hosackia** have pubescent or strigulose ovaries.

18. **L. garcinii** DC., Prod. 2: 212 (1825); Boiss. (1872); Tackholm (1956).

Ononis aucheri Jaub. & Spach, Ill. Pl. Or. t. 96 (1844).

L. stocksii Boiss., Fl. Or. 2: 174 (1872); Vierhapper (1907); Cufodontis (1955).

SINAI: (fide Tackholm). TRUCIAL COAST. OMAN. ADEN: *Beevor* s.n. S. PERSIA: (*Garcin* s.n. type), *Aucher* 4393, isotype of *O. aucheri*. BALUCHISTAN: *Stocks* s.n. isotype of *L. stocksii*. SOGOTRA & ABD EL KURI: (fide Vierhapper). SOMALIA: Obbia (fide Cufodontis). BRIT. SOMALILAND: Zeila, *Drake Brockman* 693.

This species does not seem to have previously been recorded from British Somaliland. There is a considerable amount of variation, the type of *L. stocksii* being a stout plant in which all or most of the 6 ovules mature, while in the usual form of *garcinii* all but two or three abort. Such a difference may well be due to environmental factors.

Baker's (1871) account of *L. garcinii* from the Sudan is mysterious; he cites 'Banks of the White Nile, Kotschy' but no specimen of *L. garcinii* from the Sudan, whether collected by *Kotschy* or anyone else, is at Kew or the British Museum, nor can a specimen of any other species labelled by Baker as *garcinii* be found. It appears that E. G. Baker (1926), Broun & Massey (1929) and Andrews (1952) who all record *L. garcinii* from the Sudan simply copied Baker without having seen any specimen.

A possible solution is to be found in the fact that plants collected in Scind by Stocks and others, identified as *L. stocksii* by Boissier (1872) and as ? *garcinii* by Baker (1876) were at first misidentified as *L. nubicus* Hochst. It may be that Baker, thinking *L. nubicus* and *L. garcinii* to be conspecific, at first described *garcinii* from the Sudan on the basis of *Kotschy* 311 'ad montem Mussa in Littore Albi Nili' and that later, learning that they were distinct, he described this same specimen as *L. nubicus*, forgetting to expunge his account of *L. garcinii*. That this sort of thing did happen in the haste with which Vol. 2 of the Flora of Tropical Africa was prepared is shown by Baker's description of one and the same specimen on p. 50 as *Trigonella marginata* and on p. 59 as the basis for a synonym for *Trifolium subrotundum*. In any case *L. garcinii* should be excluded from the Sudan flora till a specimen can be produced.

Bibliography.

- F. W. Andrews (1952), Flowering Plants of the Anglo-Egyptian Sudan 2: 221-2.
E. G. Baker (Bak. f.) (1926), Leguminosae of Tropical Africa 1: 85-91.

- (1930) Leguminosae of Tropical Africa 3: 877-9.
 J. G. Baker, (Bak.) (1871), Flora of Tropical Africa 2: 61-4.
 — (1876), Flora of British India 2: 91.
 I. B. Balfour (1888), Botany of Socotra 70-72 (Trans. Roy. Soc. Edin. vol. 31).
 G. Bentham (1865) in Bentham & Hooker, Genera Plantarum 1: 490-1.
 E. Bossier (1872), Flora Orientalis 2: 163-174.
 A. Brand (1898), Monographie der Gattung Lotus, Engler Bot. Jahrb. 25: 166-232.
 J. P. M. Brenan (1953), Plants collected by the Vernay Nyasaland Expedn., Mem. N. York Bot. Garden 8: 248.
 A. F. Broun & R. E. Massey (1929), Flora of the Sudan 181-2.
 E. Chiovenda (1903), in Pirota, Flora Eritrea, Ann. Ist. Bot. Rom. 8: 85-7.
 — (1908), *ibid.*, 409-410.
 G. Cufodontis (1955), Enum. Pl. Aethiop. Sperm. in Bull. J. Bot. Ét. Brux. 25: 256-60.
 A. P. De Candolle (1825), Prodrum 2: 208-215.
 A. Engler (1892), Hochgebirgsflora des tropischen Afrika (Abh. Konig. Preuss. Ak. Wiss. 1891) p. 256.
 E. L. Green (1890), Enumeration of the North American Loti, Pittonia 2: 133-150.
 H. Harms (1897), Ann. Ist. Bot. Rom. 7: 91.
 K. Larsen (1955), Cytotaxonomical studies in Lotus II, Bot. Tidsskrift 52: 8-17.
 — (1956), Cytotaxonomical studies in Lotus III, *ibid.* 53: 49-56.
 A. M. Ottley (1923), Revision of the Californian species of Lotus, Univ. Calif. Publ. Bot. 10: 189-305.
 — (1944), American Loti with special consideration of a proposed new section Simpeteria, Brittonia 5: 81-123.
 F. Pax (1907), Eng. Bot. Jahrb. 39: 626.
 A. Richard (1847), Tent. Flor. Abyssinicae 1: 176-8.
 M. Rikli (1900), Die Schweiz. Dorycnien, Ber. Schweiz. Bot. Ges. 10: 10-44.
 — (1901), Die Gattung Dorycnium, Eng. Bot. Jahrb. 31: 314-404.
 O. Schwarz (1939), Flora des tropischen Arabien, Mitt. Inst. Allg. Bot. Hamburg Bnd. 10: 100-101.
 G. Schweinfurth (1896), Sammlung Arab.-Aethiop. Pflanz., Bull. Herb. Boiss. 4, app. 2: 231-6.
 W. T. Stearn (1937), Dates of publication of Webb & Berthelot, Hist. Nat. des Iles Canaries, J. Soc. Bibl. Nat. Hist. 1: 49-64.
 V. Tackholm (1956), Student's Flora of Egypt 291-5.
 P. Taubert (1894) in Engler & Prantl Naturl. Pflanzen., Fam. 3: 3: 257-8.
 F. Vierhapper (1907), Beitr. Kenntniss. Flor. Sud-Arab., Sokotra, Semha & Abdel Kuri p. 42 (Denkschr. Mat. Nat. Wiss. Class. Kais. Ak. Wiss. Wien 71: 361).
 P. B. Webb (1837-48) in Webb & Berthelot, Hist. Nat. des Iles Canaries, part 3, Phytog. 2: 81-91 (Aug. 1942) and t. 57-65 (1837-48).

INDEX

Names of genera and subgenera in heavy type; names of species here treated as synonyms in italics. Numbers and sectional references in heavy type are those where the species is treated as such, those in ordinary type where it is listed as a synonym or mentioned in discussion.

subgenus Canaria	intr. C.	<i>D. spectabile</i> (Choisy) ex DC.) Webb	
<i>Crotalaria minor</i> Wright	7.		intr. C.
Dorycnium	intr. C.	Helminthocarpon	intr. C.
<i>D. broussonetii</i> (Choisy ex DC.) Webb		Hosackia	intr. C. , 17.
	intr. C.	<i>Lotus arabicus</i> L.	intr. , 10, 11, 12,
<i>D. eriophthalmum</i> (Webb) Webb	intr. C.		13, 14, 15, 17.
<i>D. hirsutum</i> (L.) Ser.	intr. C.	<i>L. arenarius</i> Brot.	
<i>D. quinatum</i> (Forsk.) C. Christ	10.		subgen. Pedrosia
<i>D. schimperi</i> Jaub. & Spach.	10.	<i>L. assakensis</i> Coss. ex Brand	17

<i>L. becquetii</i> Boutique	3, 3A, 3B	<i>L. minor</i> (Wright) Bak. f.	7.
<i>L. brachycarpus</i> Hochst. & Steud. ex A. Rich.	10, 11, 16.	<i>L. mlanjeanus</i> Gillett	7.
<i>L. brandianus</i> Harms	6.	<i>L. montanus</i> A. Rich.	10, 16.
<i>L. chazalei</i> Boissier		<i>L. namulensis</i> Brand	4, 6, 8, 8A.
	subgen. Pedrosia .	<i>L. nubicus</i> Hochst. ex Bak.	10, 16, 18.
<i>L. coimbrensis</i> Willd.	17.	<i>L. nyikensis</i> Bak. f.	4.
<i>L. corniculatus</i> L.	intr., 1, 7.	<i>L. oehlerii</i> Harms	4.
<i>L. discolor</i> E. Mey.		<i>L. oxyphyllus</i> Harms	8A.
	intr., 1, 4, 5, 6, 7, 8.	<i>L. palustris</i> Willd.	2.
<i>L. ehrenbergii</i> Schwnf. ex Vierhapper	15, 17.	<i>L. quinatus</i> (Forsk.) Gillett	intr. C., 10, 11.
<i>L. eriophthalmus</i> Webb.	intr. C.	<i>L. roseus</i> Forsk.	12.
<i>L. eylesii</i> Bak. f.	8.	<i>L. roudairei</i> Bonnet	intr. C.
<i>L. friesiorum</i> Harms	1.	<i>L. schimperi</i> Steud. ex Boiss.	15, 17.
<i>L. garcinii</i> DC.	18.	<i>L. schoelleri</i> Schwnf.	1.
<i>L. glinoides</i> Del.	12, 14, 15, 17.	<i>L. spectabilis</i> Choisy ex DC.	intr. C.
<i>L. goetzei</i> Harms			18.
	intr., intr. C., 3, 3A, 4, 8, 8A.	<i>L. stocksii</i> Boiss.	9.
<i>L. hebecarpus</i> Gillett	intr. B., 17.	<i>L. subdigitatus</i> Boutique	1, 6.
<i>L. hebranicus</i> Hochst. ex Brand	11.	<i>L. tigrensis</i> Bak.	13, 17,
<i>L. jacobaeus</i> L. subgen. Pedrosia .		<i>L. torulosus</i> (Chiov.) Fiori	17.
<i>L. jaegeri</i> Harms	4.	<i>L. trichocarpus</i> Lag	14.
<i>L. jolyi</i> Batt. subgen. Pedrosia ,	17.	<i>L. trigonelloides</i> Webb	5, 7.
<i>L. kilimnjaricus</i> Bak. f.	4.	<i>L. wildii</i> Gillett	18.
<i>L. lalambensis</i> Schweinf.	10, 11.	<i>Ononis aucheri</i> Jaub. & Spach.	10.
<i>L. lamprocarpus</i> Boiss.	2.	<i>O. quinata</i> Forsk.	17.
<i>L. lebrunii</i> Boutique	3, 3A, 3B.	Subgenus Pedrosia after Key,	18.
<i>L. loweanus</i> Webb	17.	<i>Trifolium subrotundum</i>	18.
<i>L. mearnsii</i> De Wild.	1.	<i>Trigonella marginata</i>	18.

Maples cultivated in the United States and Canada.*—In the space of 56 pages, set in elegant old style type and furnished with useful illustrations, this attractively produced bulletin presents a wealth of information on the genus *Acer* and on the species cultivated in North America where they form one of the most important groups of deciduous trees for shade and ornament. There, as in the British Isles, they are valued for their great variation in size and form of leaf, as well as for the autumn coloration of their foliage. The work includes chapters on their botanical classification, hybrids, chromosome numbers, on propagation, an alphabetical list of maples cultivated in arboreta and botanic gardens in the United States and Canada, the whole completed by a useful bibliography.

C.E.H.

* Maples Cultivated in the United States and Canada, by Brian O. Mulligan, pp. 56, 9 illustr., August 1953. Published by the American Associations of Botanical Gardens and Arboretums, P.O. Box 216, Lima, Delaware Co., Pa., United States. Price \$2.00.

Two New Species of *Oldenlandia* from East Africa

C. E. B. BREMEKAMP

Oldenlandia oxycoccoides Brem., sp. nov. in subgenere *Anotidopse* (Hook. f.) K. Schum. includenda sed a speciebus aliis subgeneris huius hactenus notis capsula non rostrata diversa, caulibus decumbentibus et interdum hic inde radican- tibus, foliis latoribus, floribus heterostylis, cellulis testae parietibus undulatis instructis ad ***O. bullockii*** Brem., nom. nov. (= *O. verticillata* Bullock ex Brem. in Verh. Kon. Ned. Akad. v. Wetensch., Afd. Natuurk., ser. 2, **48** (4), 199 (1952), non L., Mant. **1**, 44 (1767)) accedens sed seorsum capsula non rostrata caulibus gracilioribus ex internodiis brevioribus compositis, foliis floribusque minoribus, floribus singulis vel in paria dispositis ab ea distinguenda.

Herba annua vel perennis, ramosissima, caulibus ramisque decumbentibus interdum hic inde radican- tibus. *Caules* ramique plicatuli, glabri vel sparse pilosi, graciles, plerumque 0.2–0.5 mm. diam., internodiis 5–15 mm. longis. *Folia* petiolata; petiolus 0.5–1.0 mm. longus, parce pilosus; lamina plerumque ovato-orbicularis, 4–5 mm. longa et 3–4.5 mm. lata, basi rotundata, rigidior, concolor, siccitate vix conspicue discolorata, margine parce ciliata, ceterum utrimque glabra, costa sub- tus prominente, nervis inconspicuis. *Vagina stipularis* inter folia in lobum 0.4 mm. longum et in fimbrias duas 0.2 mm. longas exeuntem producta. *Flores* singuli vel in paria dispositi, primum terminales, deinde in positionem lateralem coactae, heterostyli; pedicelli glabri, ad anthesim 1–2 mm. longi, post anthesim usque ad 7 mm. elongati. *Calycis lobi* deltoidei, 1.0 mm. longi, margine ciliati. *Corolla* rubro- viridis dicta, tubo 0.2 mm. alto intus glabro, lobis 1.2 mm. longis. *Stamina* in flore brachystylo filamentis 1.0 mm. longis ad incisuras corollae inserta, in flore dolichostylo filamentis 0.2 mm. longis paulo infra incisuras inserta; antherae 0.3 mm. longae. *Granula pollinis* 3-colporata, 22 μ alta et 19 μ diam. *Ovarium* glabrum. *Stylus* in flore brachystylo 0.1 mm., in flore dolicho- stylo 1.2 mm. longus; stigmata subglobosa, 0.1–0.2 mm. diam. *Capsula* subglabra, 1.0 mm. alta et 1.7 mm. diam., calyce margine ciliato coronata, rostro intra calycem non producto. *Semina* saturate brunnea, madefacta non glutinosa; cellulae testae parietibus undulatis instructae, densissime sed minutissime punctatae.

Habitat Tanganyikam.

TANGANYIKA. Southern Highlands Province, Iringa District, Nguazi, 1500 m., *Carmichael* 359 (EA, holotypus).

The very close resemblance between *O. oxycoccoides* and *O. bullockii* compels us to include our new species in the subgenus *Anotidopsis*. This, however, necessitates a slight widening of the latter's delimitation. Instead of 'Capsula intra calycem in rostrum parte basali dimidio brevior producta', we will now have to read 'Capsula plerumque intra calycem in rostrum parte basali dimidio brevior producta, rarius non rostrata.'

Oldenlandia marginata Brem., sp. nov. in subgenere *Oldenlandia* (*Eu-oldenlandia* K. Schum.) includenda, inflorescentiis fere omnibus terminalibus a speciebus aliis subgeneris huius diversa, more hoc ad subgenus *Cephalanthium* Brem. accedens, sed habitu annuo, inflorescentiis ad anthesim subsessilibus, post anthesim in positionem lateralem coactis, calyce usque ad basim partito, colpis pollinis non laevi-marginatis, cellulis testae parietibus undulatis instructis ab subgenere eo omnino distincta, inter species subgeneris *Oldenlandiae* floribus breviter pedicellatis et testae cellulis non granulatis instructas floribus heterostylis et stylo hirtello ad *O. umbellatam* L. et *O. eludentem* Brem. accedens, habitu *O. somalae* Chiov. similior, sed foliis pro rata latioribus et ut calycis lobi albo-marginatis ab eis facilius distinguenda.

Herba annua, caule erecto fere quoque nodo ramificato, ramis patentibus iterum ramificatis, infimis cauli subaequilongis, 5.5–12.0 cm. alta et 7.5–15 cm. diam. *Caulis* ramique teretes, 1.2–3.0 mm. diam., dense albo-hirtelli, internodiis 0.4–1.5 cm. longis. *Folia* sessilia, lanceolata vel minora linearilanceolata, 0.8–2.5 cm. longa et 2.8–7.5 mm. lata, plerumque tamen circiter 1.3 cm. longa et 5 mm. lata, siccitate lutescentia vel fucescencia, supra scabrido-hirtella, subtus costa solum hirtella, margine siccitate revoluta alba, costa latiore etiam colore albo conspicua supra basim versus impressa subtus prominente, nervis utroque latere costae 2 vel 3 vix distinguendis. *Vagina stipularis* 1–2 mm. alta, in appendices filiformes utroque latere rami plerumque 2 vaginae subaequilongas vel ea paulo longiores producta. *Inflorescentia* primum terminalis sed post anthesim ramulo singulo axillari in positionem lateralem coacta vel ramulis duobus superata, ad anthesim subsessilis, post anthesim interdum pedunculo usque ad 5 mm. longo elata, basi dichasialis, e floribus 3–7 composita, internodiis ad anthesim brevibus post anthesim interdum usque ad 3.5 mm. elongatis, pedicellis ad anthesim circiter 1 mm. longis post anthesim interdum usque ad 3 mm. accrescentibus. *Flores* heterostyli. *Calyx* usque ad basim partitus; lobi ovati, acuti, albo-marginati, hirtelli, 1.3 mm. longi. *Corolla* alba, extra glabra, tubo 2.0 mm. longo intus ad orem dense ceterum sparse piloso, lobis 1.7 mm. longis apice uncinatis intus ad basim dense albo-pubescentibus apicem versus albo-papillosis. *Stamina* in flore brachystylo filamentis glabris 0.6 mm. longis instructa, in flore dolichostylo sessilia; antherae 0.9 mm. longae. *Granula pollinis* tricolporata, inter colpas aequaliter punctata, 25 μ longa et 20 μ diam. *Ovarium* parce hirtellum. *Stylus* in flore brachystylo 1.2 mm., in flore dolichostylo 3.0 mm. longus, totus hirtellus; stigmata 0.6–0.8 mm. longa. *Capsula* parce hirtella, intra calycem vix produca, sine calyce 1.5 mm. alta, 2.0 mm. diam., calycis lobis vix elongatis coronata. *Semina* subglobosa, madefacta glutinosa, cellulis testae parietibus undulatis instructis.

Habitat Kenyam.

KENYA. Lamu District: Osine, on sand dunes, *Greenway & Rawlins* 9289 (EA, holotypus, K, isotypus). 48 km. north of Lamu, between Nkokoni and Aswe, on sand dunes, *Rawlins* 107 (EA).

O. marginata is a typical psammophyte, with a long, in its upper part contractile primary root and a densely leafy, almost hemispherical aerial part, which catches a considerable amount of sand between the short hairs with which all its parts are covered.

Moringa—a Correction

B. VERDCOURT

(East African Herbarium, Nairobi, Kenya)

This note is the result of the investigation of an erroneous determination published recently by Mr. Dale and myself.

In 'Indigenous Trees of Uganda' Second Edition, p. 265 (1952) a description of a *Moringa*, said to be from Karamoja, Uganda (but very probably from just within the Kenya border), is given under the name *M. peregrina* (Forsk.) Fiori and a specimen Eggeling 5615 cited. When a specimen of a *Moringa*, also from the Turkana area of Kenya, was collected by Mr. C. F. Hemming (*Hemming* 275), I immediately identified it with the Eggeling sheet and published the record (Kew Bull. **1955**, 601 (1956)) under the same name, without realising that *M. peregrina* is conspecific with *M. aptera* Gaertn. This error is really quite absurd and unforgivable, since *M. peregrina* has small leaflets and almost wingless fruits, whereas the Turkana species has large, pointed leaflets and seeds with wings at least 6 cm. long! *M. peregrina* does not occur in Kenya and Uganda at all but has a north-easterly distribution. At least four species of *Moringa* occur in East Africa and the naming of *Hemming* 275 involved the borrowing of the types of various species described by E. Chiovenda and A. Engler. I am indebted to Prof. Pichi-Sermolli for the loan of these types. It was at once apparent that the Turkana species is conspecific with *Moringa streptocarpa* Chiov. The thickened apiculae of the pubescent leaves, the large seed wings and the grooved capsule valves are identical. The Turkana specimen has, however, much shorter capsules. The type material of *M. streptocarpa* partly consists of an immature capsule 44 cm. long and almost topotypic material from Moyale in Kenya, kindly collected by Mr. D. W. R. Evans at my request, shows that mature capsules are 50 cm. long and 2.5 cm. wide, with seeds 8–8.5 cm. long, including the wings. The Turkana specimen on the other hand, has the capsules only 19.75 cm. long and 2.3–2.6 cm. broad but otherwise identical in shape and texture. The seeds, also, are almost identical in shape and size. It is possible that further material will demonstrate that the short-capsuled Turkana form is a distinct nameable variant but insufficient material is available.

Cufodontis has recently published (Senck. Biol. **38**, 407 (1957)) the view that *Donaldsonia stenopetala* Bak. f., a plant long without a definite family position, is conspecific with *M. streptocarpa*. The type was collected to the N.E. of L. Rudolf and consists of a portion of a seemingly simply pinnate leaf and some flowers. The leaf fragment is, however, obviously part of a bipinnate leaf. The flower structure of Eggeling 5615 and *Hemming* 275 agrees entirely with that of *Donaldsonia*. Mr. Gillett of Kew is working on the family and I do not wish to discuss at length anything not concerned with the correcting of my previous error but the question of the possible generic distinctiveness of *Donaldsonia* must be briefly touched on. The genus *Moringa* can be divided as follows:

Section *Moringa*—Flowers irregular, perigynous; calyx tube short. Seeds winged or almost unwinged.

Section *Dysmoringa* Engl.—Flowers irregular, perigynous; calyx tube long. Seeds winged.

Donaldsonia differs markedly from both of these in having regular, hypogynous flowers with an intrastaminal disc. The staminodes are less than half as long as the stamens, instead of more than half as long and the stamens and style are straight instead of curved; the seeds have enormous wings and the petals are peculiarly densely hirsute inside. Although these differences are considerable, Mr. Gillett and Dr. Hutchinson (*in litt.*) inform me, that although they at first thought *Donaldsonia* a distinct genus, the Madagascan *Moringa hildebrandtii* Engl. displays some intermediate characters. The peculiar thickened apiculae of the leaflets in *Donaldsonia* are also noticeable in *M. ruspoliana* which otherwise has the typical flower structure of *Moringa*.

Donaldsonia is best considered a section or subgenus of *Moringa* and the correct name for the Turkana species is *Moringa stenopetala* (Bak. f.) Cuf.

***Moringa stenopetala* (Bak. f.) Cuf.** in Senck. Biol. **38**, 407 (1957).

M. streptocarpa Chiov. in Miss. Biol. Borana, Racc. Bot., Angiosp.—Gymnosp. **51**, t. 4 (1939).

Donaldsonia stenopetala Bak. f. in Journ. Bot. **34**, 53, t. 355A (1896).

[*Moringa peregrina sensu* Dale, Indigenous Trees of Uganda, ed. 2, 265 (1952) and Verdcourt in Kew Bull. **1955**, 601 (1956) *non* (Forsk.) Fiori].

ETHIOPIA. N.E. of Lake Rudolf, August 1895, *Donaldson Smith* (BM, holotype of *Donaldsonia stenopetala*, EA, photo!). Sagan-Omo, lungo il seghido, raccolto solo un seme sulle sabbie dell'uadi (single seed only), 24 August 1939, *Corradi* 8542! (FI). Asile Pozzi del Meno, 27 June 1939, *Corradi* 4175! & 4176! (FI). Moyale, *Cufodontis* 746! (FI, holotype of *M. streptocarpa*).

KENYA. Northern Frontier Province: Moyale Boma, Jan. 1958, *D. W. R. Evans* H13/58 (EA, K): tree to 12 m., regenerating around the Boma. Isiolo, growing near main street, possibly planted, 1050 m., 17 April 1958, *Hemming* 1314! (EA, K): tree to 9 m. tall, bark smooth, wood soft, flowers yellow-green, fruits long and 3-sided. Turkana Province (a variety with small capsules 1.975 × 2.3–2.6 cm.): Bottom of Napau Pass, 02° 25' N.; 34° 50' E., beside dry watercourse, 1140 m., April 1946, *Eggeling* 5615! (EA, K): tree 9 m. tall, foliage fresh apple green, leaves '3-pinnate with many stipular glands', flowers white, 'escented' (*sic*), branches brittle; and Lodwar, riverside forest, R. Turkwell with *Hyphaene*, *Acacia*, *Salvadora* and *Cadaba rotundifolia*, 480 m., 1 July 1954, *Hemming* 275! (EA, K): tree to 12 m., smooth white bark, wood very soft, flowers pale yellow.

Variation in the length of capsules in *Moringa* is quite well-known. *M. oleifera* usually has capsules 22–35 cm. long and 1.75–2.6 cm. wide but capsules as small as 10 × 1.5 cm. are not uncommon.

The following key will serve to distinguish the species of *Moringa* I have seen from Kenya.

KEY TO MORINGA SPP. OCCURRING IN KENYA

1. Calyx tube tubular, plant with large tuberous root and few stems

M. longituba Engl.

— Calyx tube not tubular, trees or small woody shrubs 2

2. Flowers regular, hypogynous; petals very densely villous inside; ovary densely hirsute; seeds with large wings, 6–9 cm. long inclusive; leaflets large, 3.3–6.5 × 1.8–3.25 cm., pubescent, pointed and with thickened apiculae *M. stenopetala* (Bak. f.) Cuf.

— Flowers irregular, perigynous; petals glabrous or pubescent; ovary $\pm$ glabrous or pubescent, seeds under 4 cm. long inclusive of wings; leaflets smaller, obtuse to rather acute at the apex 3

3. Cultivated tree to 7.5 m. tall; ovary pubescent; leaflets obtuse, finely pubescent; sepals pubescent; hairs at base of filaments slender and acute
M. oleifera Lam.

— Small woody herb or shrub to 0.9 m.; ovary glabrous; leaflets mucronate, glabrous; sepals $\pm$ glabrescent outside; hairs at base of filaments rather thick and $\pm$ dilated
M. sp. nr. rivae Chiov. (*Napier* 1070! (EA, K) from Voi)

It is hoped that the correct name for the unnamed species will be ascertained by Mr. Gillett when he looks into the genus thoroughly. It could be a new species. Unfortunately some of the type materials are in very poor condition.

I wish to thank Mr. Gillett for kindly reading this note and correcting several errors.

Flora of Guatemala.*—This important and useful Flora of a tropical country rich in natural beauty and varied types of vegetation began to be published more than 12 years ago at the Chicago Natural History Museum, as vol. 24, pt. IV., of *Fieldiana*. The present part is of especial interest since it opens with a 'plan of the Flora' and acknowledgments. This introduction is not followed by a key to the families, which presumably has been deferred to the final section. The rest of the volume deals with the Gymnosperms and with a large number of families of Monocotyledons, including the *Cyperaceae*, *Palmaceae* (revised by Dr. H. E. Moore), *Araceae*, and *Bromeliaceae* (by Dr. Lyman B. Smith). The account of the *Cyclanthaceae* comes just too soon to incorporate the views of the monographer, Dr. G. Harling. As in previous parts, there are many interesting notes following the descriptions, and a number of pleasing illustrations rather meagrely supplied with floral analyses. The introductory plan indicates which areas of Guatemala need further exploration, and has some sensible comments on the dangers and difficulties encountered in the collection of vernacular names. It is hoped that this Flora, which includes all the flowering plants of British Honduras, will be completed, although we understand that neither author is now on the staff of the Chicago Natural History Museum.

N.Y.S.

* Flora of Guatemala, by Paul C. Standley and Julian A. Steyermark, being *Fieldiana: Botany*, vol. 24, part I. Chicago Natural History Museum, 1958. Pages ix + 478, text figs. 121. \$8.00.

“Parsnip” Dermatitis

BARBARA J. YOUNGMAN

The subject of plant dermatitis is one on which relatively little has been published. Coming within the scope of both botany and medicine it is difficult to obtain a complete picture of the problem. There are so many conflicting reports probably due to mistaken identifications of the species involved and to different susceptibilities. An instance of dermatitis, almost certainly caused by an umbellifer, was brought to my notice in the late summer of 1956. The incident took place in Nelson, Lancashire and the information was communicated to me by the local parks superintendent, in whose domain the offensive plants were growing.

Early in August four boys, aged twelve to thirteen years, were playing in a park woodland area, where there was a well established patch of nettles and cow parsnips. They broke down stems of the latter and used them as swords, also one boy held a portion of the hollow stem to his eye as a telescope. The following day all the boys had developed a red rash on the exposed parts of their bodies—knees, hands, wrists and the one boy round his eye, and the day after large watery blisters appeared. They all received hospital treatment and the symptoms were pronounced far too severe for nettle stings, in fact more consistent with acid burns. The boys were from different families and the morning in question was the only time they were together. They had apparently played in the one place only and were emphatic that they had not been in contact with any chemicals. No weed-killing chemicals had been used in the park area either. These facts and the incidence of blisters round the eye of the boy lead one to presume that the plants of cow parsnip were, at least in part, responsible for the skin affliction. Members of the park staff who later handled the plant felt no ill effect. It has now been possible to make an accurate identification of the cow parsnip involved. It was *Heracleum mantegazzianum* Somm. & Lev.

This species is native to the Caucasus. It was introduced to Britain as a garden plant and has since become naturalized here in waste places, particularly near rivers. The plant has also become a garden-escape in a number of other temperate regions to which it was introduced. *Heracleum mantegazzianum* grows to an enormous size, reaching as much as twelve feet in height. The hollow stems may be four inches in diameter and the pinnately divided leaves three feet in length. A number of instances have been recorded where contact with this plant has produced reddening or even blistering of the skin, although it must have been handled on many occasions without ill effect. Other giant *Heracleum* species introduced to gardens are reported to cause similar symptoms.

One of these, *Heracleum lanatum* Michx., a north American species, is a common forage plant of moist ranges and pastures. It has been reported that cattle have been poisoned through eating the foliage but there is little evidence that it is harmful under normal conditions. The young tender leaves and peduncles have in fact been utilized as a vegetable, particularly in California, where they are said to be sweet and agreeably aromatic. How-

ever a number of writers record acrid and poisonous properties for this species, leaves and roots when applied to the skin causing vesication. It has been suggested that it is only the wet foliage that causes this condition, which may partially account for conflicting reports.

Heracleum sphondylium L. is the common cow parsnip in the British Isles and is found growing in the hedgerows, most meadows and open woodlands. It is native to Europe, western and northern Asia, west north Africa and has also been introduced and naturalized in N. America. This species is usually thought to be innocuous and has even been recommended as a forage plant. The common names 'cow parsnip' and 'hogweed' have arisen from the readiness with which these animals will eat the plant. However there are reports that slight injury may be caused to grazing animals in the form of blistering of the lips and mouth. A search through the literature has revealed that plants, identified as *Heracleum sphondylium*, have been suspected of causing injury to man or beast on a number of occasions. Withering, writing as early as 1792, notes the acrid nature of the stalk peelings. The interior of the stems and petioles is however mucilaginous and slightly sweet and a sugar delicacy has been prepared from them in parts of Russia. The peeled young stems have also been used as a salad and boiled with the leaves as a green vegetable in various regions. However, in all accounts of its edible nature, the removal of the acrid skin of *H. sphondylium* is stressed. Even so the plant can usually be handled with impunity.

An outstanding case to the contrary occurred in Belgium in 1856 and was recorded in the literature on poison plants of that time. It bears some similarity to that of the boys in Nelson recorded above, except that a different species of *Heracleum* was involved. Workmen uprooting plants, said to be *H. sphondylium*, experienced skin inflammation and blistering of exposed parts. It was during a heatwave and those working early in the day, when there was a heavy dew, were most seriously affected. Henslow suggests that the essential oil is probably therefore the causal agent, evaporating during the heat of the day but condensing in the dew in the early morning. This affection has been known in Belgium as 'Panaisie' or 'mal de panais'. *Heracleum alpinum* L. can cause similar symptoms. Gillot reports that the day after collecting an armful of this plant he experienced a burning sensation, followed by severe blistering and inflammation of arms and hands, where they had been in contact with the plant. Complete recovery took fifteen days. It thus becomes evident that more or less severe cases of dermatitis may be caused by plants of several species of *Heracleum* from widely different areas.

A similar affliction recorded on a number of occasions in France, where it is known as 'maladie de la pastenade', is associated with the wild parsnip *Pastinaca sativa* L. Although this species is widely distributed throughout France, cases of parsnip dermatitis are almost completely confined to the north east of the country and in particular to the Paris basin. This has led to the suggestion that a particular race or variety of the parsnip may be involved. *Pastinaca urens* Requier., a species sometimes separated from *P. sativa*, has been described as vesicant, as its name implies, and therefore thought to be the answer to the problem. However this species is found through central and S. France, which does not correspond to the distribution of the reported cases of dermatitis.

Pastinaca sativa is native to Europe, except the extreme north and Portugal, eastwards to the Caucasus and temperate Russian Asia. In the British Isles it is found growing along roadsides and in waste places, native in England and Wales and as an escape from cultivation in Scotland and Ireland. The vegetable, parsnip, referable to this species, is widely cultivated and has been introduced to N. and S. America, Australia and New Zealand, in which areas it has become naturalized. In N. America, Australia and New Zealand it is reported that certain individuals are susceptible to parsnip poisoning, developing skin eruptions on contact with flowers or leaves. In Britain also, although usually considered harmless, both the wild and cultivated parsnip may cause dermatitis. An instance of a small boy developing 'burns' on his hands after playing with the wild plants was brought to my notice recently.

Other members of the Umbelliferae are known to cause dermatitis in certain susceptible individuals and include such common economic plants as angelica (*Angelica officinalis* Hoffm.), carrot (*Daucus carota* L.) and celery (*Apium graveolens* L.). The family also contains a number of species that are virulent poisons, e.g. Hemlock (*Conium maculatum* L.) and water dropwort (*Oenanthe crocata* L.). One S. African member of this family (*Peucedanum galbanum* Bth. & Hook.) causes such widespread dermatitis that it is commonly known as 'blister bush'; both man and livestock are affected.

Various theories of the vesicant action of *Heracleum* and *Pastinaca* species have been put forward but none of them adequately explains all the facts observed. All the species involved contain essential oils. Can these be responsible for the skin condition? An investigation of plants, said to be *Pastinaca urens*, showed that the oil distilled from the plant was non irritant; nor had the hairs on the surface of the plant any adverse effect. It was not stated in this report, however, whether the tests were made on susceptible individuals. It is also possible that conditions of growth affect the toxic properties of a plant and it has been suggested that only wet foliage is involved or that the plants of these species grown in very humid conditions are liable to cause injury. Some form of photosensitization has also been considered. Unfortunately the toxic principles of *Heracleum* and *Pastinaca* have not been isolated or identified so that the vesicant action of these plants cannot as yet be explained.

Bibliography

1. Chittenden, F. J. (1931). Plants causing skin irritation. Gard. Chron. **90**: 332-4 & 353.
2. Connor, H. E. (1951). Poisonous Plants of New Zealand. N.Z. Dept. Sci. Ind. Res. Bull. 99.
3. Cooper, P. (1952). Poisoning by umbelliferous plants. Pharm. Jour. **169**: 18.
4. Fournier, P. (1947). Plantes Médicinales et Vénéneuses de France.
5. Gillot, X. (1901). Note sur l'action vesicante de *Heracleum*. Ann. Soc. Bot. Lyons. **26**: 129-132.
6. Güssow, H. T. (1907). Injurious fodder and poisonous plants. Jour. Roy. Agric. Soc. **68**: 48.

7. Henslow, G. (1901). Poisonous Plants in Field and Garden.
8. Hurst, E. (1942). The Poison Plants of New South Wales.
9. Long, H. C. (1917). Plants Poisonous to Livestock.
10. Marceron, L. (1941). La maladie de la pastenade et les problèmes botaniques qu'elle soulève. Bull. Soc. Bot. France, **88**: 442-446.
11. Muenscher, W. C. (1939). Poisonous Plants of the United States.
12. Pammel, L. H. (1911). A Manual of Poisonous Plants.
13. Sturtevant's Notes on Edible Plants. (1919).
14. Withering, W. (1792). British Plants.
15. Anon. (1906). *Pastinaca urens*. Pharm. Jour. **23**: 543.

The flora of Shropshire.*—It is surprising—or perhaps fortunate—that a county which offers such a diversity of unspoilt scenery should be so little known to the general public. Shropshire keeps out of the headlines, even in botanical matters. But seclusion has its drawbacks. The only County Flora, by W. A. Leighton, published as long ago as 1841, must have seemed a little old fashioned even on its first appearance, for it employs the Linnean system of classification at a period when most botanists had accepted the Natural Systems of Jussieu, De Candolle or Lindley. A revised County Flora has been ready for publication since 1913, but, through want of local support, it remains in manuscript, and, by way of a substitute, Messrs. Lloyd and Rutter have compiled this modest, but eminently serviceable handlist, enumerating the plants recorded from the county, and giving a brief outline of the distribution of each species. It is to be hoped that Shropshire naturalists will be sufficiently stimulated by this useful little work to press for the publication of the 'Flora' which has lain dormant for so long. A county which can boast (amongst other good things) *Aconitum anglicum*, *Nuphar pumila* and *Epipogium aphyllum* should have its botanical riches appropriately displayed.

R. D. MEIKLE.

* Handlist of the Shropshire Flora, by L. C. Lloyd, F.L.S. and E. M. Rutter, Caradoc and Severn Valley Field Club, 1957, price 8/6 net.

Flowering Trees and Shrubs.*—The work under review deals with over 250 species of shrubs and smaller trees cultivated in the British Isles, which are arranged alphabetically under their Latin names. Brief descriptive notes are given for each species, as well as directions for the method of propagation of each genus. Information on suitable species for different soils, planting, grafting and other matters of cultivation are given in the first four chapters. The book is illustrated by 62 coloured plates with four species to each plate, and contains a glossary. The author has succeeded in giving a great deal of information in a very compact and handy book.

R. A. BLAKELOCK.

* The Book of Flowering Trees & Shrubs, by S. B. Whitehead, illustrated by Joan Lupton, 1956. Frederick Warne & Co. Ltd., London. 244 pages, 62 colour plates. 15/- net.

Nomenclatural Notes:—XI*

The type of the generic name *Saba*.

A. A. BULLOCK

The genus *Saba* was established by Pichon (Mém. Inst. Franç. Afr. Noire No. 35, Monogr. Landolph. 302. 1953); he had previously described the same group as *Landolphia* sect. *Saba* Pichon (Mém. Mus. Nat. Hist. Nat. n.s. 24: 140. 1948).

The type of the sectional epithet, and therefore of the generic name, was cited by Pichon (1953) as *Landolphia comorensis*, which in Pichon's synonymy is derived from '*Vahea comorensis* Bojer, Hort. Maurit. 207 (1837).' The latter name is a *nomen nudum* and therefore invalidly published. *Landolphia comorensis* was indeed not validly published until K. Schumann (in Engler, Bot. Jahrb. 15: 402, fig. 2. 1893) published a figure of it with very full diagnostic dissections and descriptive text. Schumann again derived the name from Bojer's *Vahea comorensis*, but he included in the species *Landolphia florida* Benth. (in Hooker, Niger Fl. 444. 1849), reducing the latter to '*L. comorensis* var. *florida* (Benth.) K. Schum.'

It is thus clear that *L. comorensis* K. Schum. is an illegitimate name, since Schumann ought to have adopted the name *L. florida* Benth. It is similarly clear that *Saba comorensis* Pichon is illegitimate, since he also included the same synonymy. The species therefore requires a new name:—

***Saba florida* (Benth.) Bullock, comb. nov., *typus nominis generici*.**

Landolphia florida Benth. in Hooker, Niger Fl. 444 (1849); Stapf in Thiselton-Dyer, Fl. Trop. Afr. 4 (1): 38 (1902), et in Johnston, Liberia 2 (App. 4): 616 (1906); A. Chev. Expl. Bot. Afr. Occ. Franç. 404 (1920); Hutch. et J. M. Dalz. Fl. W. Trop. Afr. 2: 32 (1931); J. M. Dalz. Useful Pl. W. Trop. Afr. 373 (1937).

L. comorensis K. Schum. in Engl. Bot. Jahrb. 15: 403 (1893).

L. comorensis K. Schum. var. *florida* (Benth.) K. Schum. l.c. ff. 1B, 2.

Vahea comorensis Bojer, Hort. Maurit. 207. (1839), *nomen*.

Saba comorensis (K. Schum.) Pichon, in Mém. Inst. Franç. Afr. Noire No. 35, Monogr. Landolph. 303 (1953).

The type of the name *Saba florida* is Vogel 101 from West Africa, cited by Benth. This note was found to be necessary whilst preparing the entry for the name *Saba* for *Index Nominum Genericorum*; the writer does not necessarily accept Pichon's separation of *Saba* from *Landolphia*.

* Continued from Kew Bull. 1958: 302. 1958.

On Putative Hybrids between *Juncus inflexus* L. and *Juncus effusus* L.

H. T. CLIFFORD

In his 'Flora of Surrey' Salmon (1931) states that hybrids between *Juncus effusus* L. and *J. inflexus* L. are not rare in places where those two species grow together. Though this may be so in south-east England it is not true of the north-east. About Durham City there are many localities where both *J. inflexus* and *J. effusus* may be found growing intermixed but putative hybrids between them are exceedingly rare.

Over a period of two years only one group of apparently hybrid plants was detected. These were found on Waldrige Fell, near Chester-le-Street where the plants were growing along the edge of a path across an area that is regularly burned. The plants were highly pollen and seed sterile. They were recognized by their gross morphology being intermediate between that of *J. effusus* and *J. inflexus*. This intermediacy extended to their pith anatomy which was neither continuous as in *J. effusus* nor chambered as in *J. inflexus*, but was intermediate.

The putative hybrids were sufficiently different from *J. inflexus* to attract attention but morphologically more closely resembled that species than *J. effusus*.

The rarity of putative hybrids in the Durham district led to their being sought for in some of the Surrey localities mentioned by Salmon (l.c.). Here also they appeared to be very rare, which suggested that some of the earlier observations may have been incorrect. Evidence produced below supports this view.

In order to gain an impression of the variability of the putative hybrids a biometrical study was undertaken of the collections of this entity in five major British Herbaria. For the purpose of this study specimens labelled *J. inflexus* $\times$ *J. effusus* were regarded as equivalent to those labelled *J. diffusus* Hoppe, (Clapham, Tutin and Warburg, 1952). To afford a comparison with these data a similar study was made of both *J. inflexus* and *J. effusus*. Specimens labelled *J. effusus* var. *compactus* Lej. et Court. were measured separately from those labelled *J. effusus*.

MATERIAL AND METHODS

The dimensions chosen for measurement were the length of the longest perianth segment and the overall inflorescence length. These were selected because *J. effusus* and *J. inflexus* differ considerably in flower and inflorescence size, and also because these organs are generally available on herbarium material.

The taking of measurements was restricted to specimens whose flowering was completed. Where what appeared to be the same collection was repre-

sented in more than one herbarium, only one specimen was measured. If a herbarium sheet consisted of more than one suitable stem that to be measured was selected at random. In each instance the material was accepted as correctly determined, even when this was not so, in order to avoid the introduction of a personal bias into the results. These results are summarized in Table 1.

TABLE 1.

Species	n	Perianth Length (eye-piece units)		Inflorescence Length (mms.)	
		Mean + S.E.	C. of V.	Mean + S.E.	C. of V.
<i>J. inflexus</i> ...	80	86.5 ± 0.96	10.7	49.8 ± 1.6	28.7
Putative hybrids .	87	73.1 ± 1.03	11.1	43.1 ± 1.7	37.7
<i>J. effusus</i> ...	110	58.0 ± 0.82	14.8	32.7 ± 1.8	56.4
var. <i>compactus</i> ...	23	60.0 ± 1.78	14.3	13.6 ± 1.4	47.8

Table 1: The mean and coefficient of variation of the perianth and inflorescence lengths for *J. effusus*, *J. inflexus* and their putative hybrid as represented in certain British Herbaria. (24.5 eye-piece units = 1 mm.).

In addition to the perianth and inflorescence lengths the nature of the pith, continuous or chambered, was determined for the putative hybrids from three of the herbaria. With one exception all the plants investigated were classifiable as belonging to one or other of these pith types. The pith type of the exception was approximately intermediate between the continuous and chambered types. Of the 63 putative hybrid plants examined 53 had continuous and 10 chambered pith.

DISCUSSION OF RESULTS

It is evident from Table 1 that the herbarium material labelled *J. diffusus* (or *J. effusus* × *J. inflexus*) is intermediate between *J. effusus* and *J. inflexus* for the dimensions studied and that the intermediacy is not obscured by the existence of two forms of *J. effusus*.

The suspected hybrids are no more variable than either of the supposed parent species, but it does not follow from this that they are a homogeneous group. As has been stated above they may be separated into two groups on the basis of their pith anatomy, excluding one specimen intermediate in this respect.

A comparison of the mean perianth lengths of the plants in these two groups reveals that it is significantly (5% level) greater in the group with a chambered pith, see Table 2. The mean inflorescence length is also greater in the group with chambered pith, but not significantly so (5% level). It is evident therefore that with respect to perianth and to a lesser extent inflorescence length the putative hybrids with a chambered pith tend towards *J. inflexus* and those with a continuous pith towards *J. effusus*.

TABLE 2.

Pith	n	Perianth Length (eye-piece units)	Inflorescence Length (mms.)
Chambered	10	82.0 ± 0.90	46.8 ± 3.83
Continuous	53	71.5 ± 0.39	41.1 ± 2.12

Table 2: The mean and its standard error for two classes of putative hybrids between *Juncus effusus* and *Juncus inflexus*.

These observations support the view that the material labelled as putative hybrids is very mixed in origin. Some of it appears to be of hybrid origin but some of it closely resembles *J. effusus* or plants of *J. inflexus* which failed to set ripe fruit.

The status of those putative hybrids that resemble *J. effusus* is difficult to decide. Some may be natural hybrids but others closely resemble *J. effusus* var. *congestus* which often has larger flowers than the typical form of *J. effusus*. For those putative hybrids which resemble *J. inflexus* it is possible to offer reasons for not regarding all the putative hybrids as of hybrid origin.

Over most of eastern England plants of *J. inflexus* which fail to set ripe fruit appear to be much commoner than fruiting plants. However, the failure of the plants to fruit does not prove that they are genetically sterile, for the sterility may have been induced by the environment. That this, in part at least, is the explanation for seed sterility in certain plants of *J. inflexus* has been demonstrated experimentally.

A series of sets taken from a single tussock of *J. inflexus* collected near Durham City were planted in the experimental garden of the Durham Colleges. As the time of flowering approached some of these plants were protected with glass domes whilst others were not. Those covered with glass produced many fruits whilst those that were unprotected failed to fruit at all though they produced abundant flowers. Seeds from the plants that fruited were subsequently germinated and produced healthy seedlings of *J. inflexus*.

It is evident from these experiments that some of the seed sterility observed in field populations of *J. inflexus* may result from environmental rather than genetic causes. For this reason criteria other than seed sterility should be considered before a plant resembling *J. inflexus* is designated as hybrid. It is suggested that some of the earlier references to putative hybrids between *J. inflexus* and *J. effusus* refer to plants of *J. inflexus* which failed to set fruits because of some unfavourable factor in their environment.

SUMMARY

A biometrical study of perianth and inflorescence length in *J. effusus*, *J. inflexus* and their putative hybrid has been undertaken on material in five British herbaria.

These studies indicate that the specimens labelled as putative hybrids are a very heterogenous group and that some of them closely resemble *J. inflexus* that has failed to fruit.

Experimental evidence has been produced which shows that in *J. inflexus* failure to fruit may often result from unfavourable environmental conditions.

ACKNOWLEDGEMENTS

The writer is grateful to Prof. D. H. Valentine for suggesting this project and to the authorities in charge of the following Herbaria for access to specimens: British Museum; Royal Botanic Gardens, Kew; Royal Botanic Garden, Edinburgh; and the Universities of Oxford and Cambridge.

REFERENCES.

Clapham, A. R., Tutin, T. G. and Warburg, E. F. 1952: *Flora of the British Isles*. Cambridge University Press.

Salmon, C. E., 1931: *Flora of Surrey*. G. Bell & Sons, Ltd.

Mountain Flowers.*—The British mountain flora, with which this work deals, is defined as consisting of species of flowering plant or fern which are principally or exclusively at home above 2,000 ft. The number is given as some 130 species (excluding critical groups of microspecies). The first part of the book presents a general account beginning with the work of the earlier British botanists from 1639 onwards. The physical features of the mountains in these islands as a habitat for plant life are considered next. Growth-form, pollination, seed-production and other methods of dispersal are described. Examples are given of the patterns of distribution shown by mountain plants and illustrated by maps. The prehistory with especial reference to the possibility of the survival of various species throughout the Glacial Periods is discussed.

The second part of the book is arranged on a regional basis—the next six chapters being devoted to accounts of the vegetation and rarer species of the various mountain regions, which are grouped as follows—(1) Snowdonia and the English Lake District, (2) the Cairngorms and Lochnagar, (3) the volcanic hills of Western Scotland, (4) the limestones of Northern England and North Western Scotland, (5) the mica-schist mountains of the Central Highlands, (6) the Irish mountains. A list of plants not uncommonly occurring above 2,000 ft., keys to the species of *Alchemilla*, *Hieracium* and *Salix* represented in the area under discussion, a series of maps showing the British distribution of twenty mountain plants are included as appendices. Bibliography and index are also given. The work is illustrated by sixteen photographs in colour and twenty-four in black and white in a manner that maintains the high standard set by publications in the New Naturalist series. The authors are to be congratulated on producing so interesting an account and a book which every one concerned with the botany of the mountain areas of Britain should read.

R. A. BLAKELOCK.

* *Mountain Flowers*, by John Raven and Max Walters, 1956. Collins, London. 240 pages, 25/- net.

Notes on African *Hypericum*

N. K. B. ROBSON

Since the publication of the writer's review of *Hypericum* in Tropical Africa (Kew Bull. 1957: 433-46 (1958)) another new species has been received at Kew and its description is published below. A new name for another species is proposed and an additional record for it is given.

Hypericum somaliense N. Robson, sp. nov. (sect. *Montanae* Stef.) *H. tomentosum* L. affinis, sed inflorescentia confertiore subglabra et sepalis glanduloso-fimbriatis differt.

Herba perennis, 15-60 cm. alta; caules teretes, erecti vel ascendentes radicanesque, albo- vel brunneo-tomentosi, basi senectute plus minusve decorticantes. *Folia* sessilia; lamina 10-18 (-23) mm. longa et 4-8 mm. lata, ovata vel oblonga, apice obtusa vel rotundata, basi rotundata vel semi-amplexicaulis, utrinque albo- vel brunneo- tomentosa, 5-7-nervata venatione laxe reticulata, glanduloso-punctata punctis pellucidis numerosis inaequalibus, punctis nigris intramarginalibus; axillae ramuligerae. *Flores* c. 10-30, in cymis corymbosis vel subcorymbosis densiuscule dispositi; pedunculi pedicellique graciles, glabri vel basi albo-pubescentes; bractee lineari-triangularae, glanduloso-fimbriatae. *Sepala* 2-5 mm. longa et 1.5-2 mm. lata, ovata vel lanceolata, apice acuta vel caudata, glandulis pellucidis longitudinaliter lineata, glandulis nigris intramarginalibus punctata, margine glandulis nigris minoribus glanduloso-fimbriata. *Petala* flava, 7-9 mm. longa, margine solum nigropunctata. *Stamina* c. 30, 3-fasciculata; antherae connectivo nigro-glanduloso. *Ovarium* c. 2 mm. longum, conicum vel ovoideum, 3-loculare; styli 3, c. 6 mm. longi, suberecti vel patuli, stigmatibus parvis non capitatis. *Capsula* immature valvis longitudinaliter resinoso-striatis; semina adhuc non visa.

SOMALILAND PROTECTORATE: Markat (10° 59' N., 48° 30' E.), 1440 m., 12.viii.1957, 'Sides of small stream and clay flush, base of alluvial cone', Newbould 886 (K, holotype); Ragad, 1440 m., 12.viii.1957, 'Clay flush, Caricetum', Newbould 895 (K.).

H. somaliense belongs to Sect. *Montana* Stef., which should be enlarged to include *H. tomentosum* L. and related species bearing axillary branchlets. Two species in this section have already been recorded from East Africa, viz. *H. annulatum* Moris and *H. afromontanum* Bullock, the former of which also occurs in Sardinia. *H. somaliense* itself forms another phytogeographical connection between East Africa and the Mediterranean region, because its closest relatives appear to be *H. tomentosum* L. (W. Mediterranean), *H. pubescens* Boiss. (S. Spain, Algeria), *H. lusitanicum* Poir. (S. Spain, S. Portugal) and *H. caprifolium* Boiss. (S. Spain). It has tomentose leaves and stems like all these species; the leaves are not perfoliate and bear short axillary branchlets, like all but *H. caprifolium*; while the form of the inflorescence and sepals resemble those of some specimens of *H. caprifolium*. The damp habitat is also characteristic of this group of species.

***Hypericum conjugens* N. Robson, nom. nov.**

H. conjunctum N. Robson in Kew Bull. 1957: 437 (1958), *non* Kimura in Bot. Mag., Tokyo 52: 193 (1938).

The area of distribution of this species is now known to extend to the eastern Belgian Congo (Kisinde-Marungu, 2000 m., iv.1944. *L. Dubois* 1090 (BR)). I am indebted to Mme. Spirlet of the Herbarium of the Jardin Botanique de l'Etat, Brussels for showing this specimen to me.

British Wild Flowers.*—This book is intended for those whose knowledge of botany has progressed beyond the more popular and simplified books on wild flowers but who are not prepared to use the professional text books on the British flora. The work is attractively produced and should fulfil the purpose for which it is meant. There are 163 black and white drawings by Miss L. Ripley and fifteen coloured plates by Miss A. Webster, although no dissections nor enlargements of flowers are given. The principles of classification and nomenclature are very briefly touched on in the introduction. A key to the genera based as far as possible on easily observed characters is supplied by Mr. R. D. Meikle. The greater part of the book consists of descriptions of a large number of species of common herbs (excluding *Gramineae* and *Cyperaceae*) arranged under their families; each family also receiving a short description. Notes on the habitat and distribution of the species and the derivation of the scientific names are provided. Many less common introduced and cultivated species are mentioned at the end of the account of the species to which they are most closely related. A glossary and an index are also included.

R. A. BLAKELOCK.

* British Wild Flowers, by Patricia Lewis, 1958. Eyre & Spottiswoode, London, 376 pages. 25/- net.

Garden Design.*—This is a fascinating book, written by a well-known landscape architect, which will surely hold the attention of all horticulturists and indeed of any who have ever made gardens.

The book is divided into four parts. The first deals with the history of gardens in Egypt, China, Spain, Italy, France and England, with their many traditions, and ends with an interesting account of the contemporary gardens of Europe and America. The second part deals with the principles of garden design and their application. In the third part the author discusses the use of the materials of design, land-form, plant-material, water, sculpture and stone-work. The construction of gardens from these materials, and their maintenance, are well and fully described and convey information and suggestions which gardeners of experience will find valuable. Many photographs and diagrams are used to illustrate the work, including illustrations of the work of modern landscape architects in various parts of the world.

Altogether Miss Crowe has written a delightful and scholarly book which all students of garden architecture and lovers of gardens should read.

H. S. MARSHALL.

* Garden Design. By Sylvia Crowe. Pp. 229. Illus. London: Country Life Ltd. 1958. Price 52/6d.

The Genus *Zoellneria* Velenovsky

R. W. G. DENNIS

In connection with recent studies of Australian *Hyaloscyphaceae* it became desirable to elucidate the taxonomic status of the genus *Zoellneria*, proposed by Velenovsky in 1934, with two species found on dead leaves in the neighbourhood of Mnichovice, Czecho-Slovakia. Through the good offices of Dr. A. Pilat authentic material of both was made available from the Cryptogamic Herbarium of the Natural History Museum, Prague.



FIG. 1. *Zoellneria rosarum*. Apothecium $\times 15$, details $\times 660$.

Zoellneria acerum Vel., on leaves of *Acer pseudoplatanus*, proves to be identical with *Hyalopeziza ciliata* Fuckel 1870, at least as interpreted and figured by Dennis (1949). *Zoellneria rosarum* Vel., however, is a very distinctive fungus, in my opinion not congeneric with *Z. acerum*, and merits further description. The generic diagnosis appears to refer mainly to *Z. rosarum* which I therefore propose to regard as the type species of *Zoellneria* as no type of the genus was indicated by its author.

***Zoellneria rosarum* Vel.**, Monographia Discomycetum Bohemiae **1**, 298 (1934).

Apothecia scattered, superficial, cupshaped, subsessile with a small base; disc flat or slightly convex, about 0.5 mm. diameter, without a raised margin, yellowish; receptacle very soft, concolorous, beset with rather sparse, stiff, brown bristles. Excipulum of parallel hyphae 3–4 μ wide, lying at a very low angle to the surface. Hairs cylindrical, with thick, smooth, brown walls, septate, 110–160 $\times$ 6–8 μ (up to 200 μ Velenovsky), with the apical cell thinwalled and swollen up to 12 μ wide (15 μ Velenovsky). Asci cylindric-clavate, long-stalked, with broadly rounded tips, about 75 $\times$ 6 μ , 8-spored, pore not blued by Melzer's reagent; ascospores uniseriate or in the upper part biseriate, cylindric-clavate, hyaline, 6–9 $\times$ 2.5 μ ; paraphyses cylindrical, with slightly swollen, rounded, hyaline tips, simple or forked above.

On dead and fallen leaves of *Rosa* sp.

I do not see the further minute thread-like hairs described and figured by Velenovsky but it is not necessary to assume that these did not exist in the fresh apothecia. Slender threads of a similar character occur in *Mollisia*, where they are very difficult to demonstrate in dried material.

Gardening for Display.*—The author of this book is Superintendent of Parks and Gardens at Brighton. With his expert knowledge of gardening and his wide experience of all types of garden plants he is fully qualified to describe the art of bedding. The work is divided into two parts. The first part deals with the role of bedding in the garden, routine management of flower beds, the propagation of bedding plants, the arrangement of flowers for display, pests and diseases, and bedding schemes. In the second part there is an encyclopedia of bedding plants listing over a hundred and eighty genera in alphabetical order, giving details of family, history, cultivation and propagation, followed by an appendix with lists of plants for special purposes.

The book is illustrated with a number of full-page line drawings and black and white photographs. It will prove interesting and useful to all those who are concerned with the planning of bedding displays.

H. S. MARSHALL.

* Gardening for Display. By J. R. B. Evison. Pp. 200. Illus. London: W. H. & L. Collingridge Ltd., New York: Transatlantic Arts Inc. 1958. Price 35/-.

Amateur Gardening Diary.*—This useful diary follows the usual pattern of former 'Amateur Gardening' diaries. It includes weekly notes of seasonable work, and sketches of plants which should normally be in bloom at the time. The directory section has been brought up-to-date and gives references to firms dealing in plants, fertilizers, insecticides, fungicides and other garden sundries.

H. S. MARSHALL.

* 1959 Amateur Gardening Diary. Pp. 160. London: W. H. & L. Collingridge Ltd. 1958. Price 7/2d.

Contributions to the Flora of Australia: V

The identity of *Calandrinia polyandra* Benth

R. MELVILLE

The name *Calandrinia polyandra* Benth (Fl. Austral. 1, 172, 1863) was published as a new combination based upon *Talinum polyandrum* Hook. (Bot. Mag. t. 4833, 1855). Hooker's name was a later homonym of *T. polyandrum* Ruiz & Pav. (Syst. Veg. Per. 115, 1798) nevertheless, under the present International Code of Nomenclature, Benth was at liberty to take up the epithet *polyandrum* and transfer it to another genus where the resulting combination was not preoccupied. The new combination, however, must be attributed to Benth alone (Art. 72, the example cited), although its type remains the type of the original name.

Hooker described his *T. polyandrum* from plants grown at Kew from seed sent by James Drummond in 1853 and collected in the Swan River Settlement. Unfortunately, none of the cultivated material was preserved nor were the seeds linked up definitely with any of the Drummond herbarium collections. The Botanical Magazine figure is an excellent representation of the plant in flower, but neither the fruiting capsules nor the seeds were described and the range of staminal numbers was not stated. The omission of these critical details from the original description render it difficult to apply the name correctly.

Benth's description of the species in the Flora Australiensis adds nothing to Hooker's account, except the information that the seeds are numerous, small, black and minutely pitted. This eliminates only the smooth seeded forms from consideration. Apart from the original of the Botanical Magazine plate, the material that both Hooker and Benth had before them, when this species was under consideration, is preserved at Kew. In order to decide the precise application of the name, it is desirable to eliminate all those specimens that did not come from the Swan River area. Only three sheets then remain, all collected by Drummond. Of these, one from Herb. Hooker bears portions of Drummond nos. 119 & 113. The latter is annotated '113 Drummond S.W. Australia 1848' with '4th. Coll' added in pencil. The second sheet bears a duplicate of Drummond 113 presented by W. W. Saunders. The third and most complete sheet of the three is from Herb. Hooker and bears a label with the words '*Talinum* sp. nova. Swan River. Drummond'. The Drummond collection number has not been recorded. This sheet, clearly, represents Hooker's conception of his *T. polyandrum*. Having recognised it as a new species he may then have asked Drummond to obtain seeds in order to grow the plant before describing it. Thus what would have been the type sheet was superseded by the living material in the preparation of the Botanical Magazine figure. On dissection the floral and vegetative characters were found to agree with Hooker's description and figure. Accordingly, this specimen has been used to draw up a description of the seed and fruit characters, which are necessary to discriminate between *C. polyandra* and related species. The seeds are reniform with an ornamentation consisting of short rounded ridges arranged in

regular rows, which follow the contours of the seed. This kind of surface is appropriately called *porcinate*, from the Latin, *porca*, a rounded ridge or hill, for which the modern equivalent is 'hog's back'.

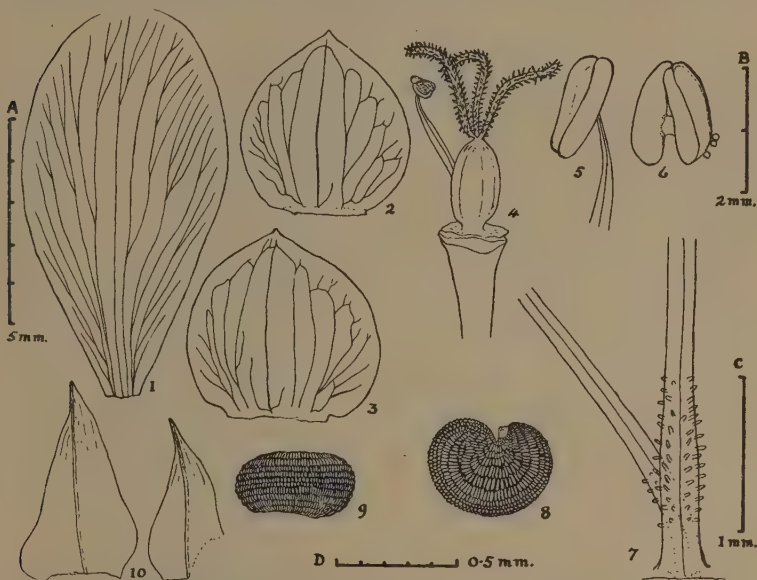


FIG. 1. *Calandrinia polyandra* Benth., from the specimen annotated by W. D. Hooker as 'Talinum sp. nov.': 1, petal; 2, outer sepal; 3, inner sepal; 4, ovary with one stamen to show relative length; 5, 6, anthers; 7, bases of inner and outer staminal filaments, the inner in front; 8, seed lateral view; 9, seed, edge view; 10, two bracts. Scales: A, 1; B, 2-4, 10; C, 5-7; D, 8, 9.

Emended description:

Calandrinia polyandra Benth. Annual herb, with ascending or decumbent stems 10-30 cm. high. Leaves alternate or occasionally the upper ones opposite, clustered at the base and on the lower parts of the stem, broadly linear to subspathulate, blunt, fleshy, channelled above, 1-3-7 cm. long. Flowers in slender terminal and axillary racemes on spreading filiform pedicels 10-20-30 mm. long, sometimes reflexed in fruit, bracts scarious, 2-3 mm. long, triangular, acute to acuminate, uni-nerved; sepals 2, opposite, broadly ovate acute, about 3-3.5 mm. long, nerves not prominent, petals 5, red-purple, spreading, oblong obovate, about 9-12 mm. long, apex rounded; stamens about 45-50, anthers yellow about 0.6-0.7 mm. long, filaments about 2.1-2.3 mm. long tapered to a slender apex, very shortly united into a ring at the base, lower quarters of inner series slightly expanded and with numerous papillae, those of the outer series not expanded and with few papillae; ovary ellipsoid crowned by three sessile filiform glandular papillose stigmas about 2 mm. long. Capsule oblong-ovoid, blunt, about 4 mm. long, slightly exceeding the calyx; seeds numerous, dark reddish brown, sometimes with a metallic lustre, subreniform, about 0.5 mm. long, 0.4 mm. wide and 0.3 mm. thick, porcinate with numerous concentric rows of rounded ridges.

Fungi venezuelani:—I;

R. W. G. DENNIS

Exobasidium Woronin

While staying on the La Mucuy estate of the Facultad de Ciencias Forestales, Universidad de los Andes, the writer collected a massive fusiform gall on what appeared to be a liane. The specimen formed part of a bare woody stem slung between two trunks in dense forest, and, though it could just be reached and cut down with a machete, it was not possible to recover the distal part of the plant or even to see normal leaves or flowers. Dr. Metcalfe has since kindly examined the wood and reports it to be referable probably to the *Vacciniaceae*, which suggests the plant may have been a scrambling epiphyte rather than a typical liane.



FIG. 1. *Exobasidium emeritense*. Basidia and spores $\times 1000$.

The largest gall, about 35 cm. long and 8–9 cm. thick, developed by hypertrophy of a stem 16 mm. diameter, is shown in the accompanying Plate 1. Its entire surface is occupied by small nodulose outgrowths, evidently aborted adventitious shoots, bearing completely hypertrophied leaves up to 2 cm. long and 5 mm. wide. When soaked up these are almost circular in cross section but they dry to irregular, twisted, strap-like bodies with longitudinally wrinkled surfaces, at first light red but becoming brown or almost black with age. The younger leaves are completely covered with a white bloom formed by the basidia and spores. In the field they bore a striking resemblance to the catkin scales of *Alnus glutinosa* attacked by *Taphrina amentorum* (Sadob.) Rostrup. A number of smaller and presumably younger galls, in which the aborted shoots occur only on one side of the main stem, will also be seen in the photograph. It is not clear whether these are due to later infections or to slow spread of mycelium through the tissues from the main gall. Mycelium of *Exobasidium vaccinii* Woronin is known to become systemic in species of *Vaccinium*, where it even penetrates into the rhizomes, and the apparent restriction of new galls to the immediate vicinity of the old one may perhaps indicate that similar slow penetration is taking place in the stem photographed.

There appears to be no species of *Exobasidium* described as causing extensive hypertrophy of large woody stems in this way. *E. leucothoes* P. Henn., on leaves and twigs of *Leucothoe* in Sta. Catarina, Brasil, was described as having 'Der Pilz parasitirt in jungen Zweigen und Blättern und ruft in ersteren hexenbesenartige Sprossungen und Verbildungen hervor'.



PLATE 1. Galls caused by *Exobasidium emeritense*. The surface of each gall is covered by hypertrophied leaves clothed with the hymenium of the fungus.

This seems to imply a localised hypertrophy of shoot tips, such as occurs with *E. vaccinii*, where the hymenium develops over the entire surface of the slightly swollen young shoots as well as on the adjacent leaves. *E. leucothoes* was also described as having spores $9-14 \times 4-5\mu$, i.e. broader than those of the Venezuelan fungus.

Though the host cannot be determined beyond the family, and most species of *Exobasidium* parasitise members of the Vacciniaceae, the fungus from La Mucuy has so distinctive a habit as to justify recognition as a distinct and probably undescribed species.

***Exobasidium emeritense* Dennis, spec. nov.**

Effusum; foliis infectis longioribus proliferisque rosaceis pruinosis, haud bullosis; basidiis 4-sporis, $15-20 \times 5-6\mu$; sterigmatibus $4-6 \times 1.5\mu$; sporis subfusoides, obtusis, curvulis vel subrectis, hyalinis, $10-11.5 \times 1.5-2.5\mu$. Foliis in incrassationibus ramorum fusiformibus insidentibus.

VENEZUELA: Estado Mérida, La Mucuy, 2600 m., Sierra Nevada de Mérida, 6.8.1958, *Dennis* 1796 typus. (Fig. 1).

The above collection was made in the course of an expedition largely financed by a grant from the Percy Sladen Trust.

A Glossary of Mycology.*—This work includes descriptions of nearly 7000 terms which, if not always strictly mycological, are likely to be encountered by students of fungi and lichens. Technical terms used in all branches of mycology, including antibiotics and medical mycology are defined and when possible the derivation and original author are indicated. However, the average person using the dictionary will have considerable difficulty in tracing the place of publication of some of the terms from such scanty information as the author's name and date of publication. These citations would have been particularly useful had they been accompanied by a bibliography. The definitions are accurate and informative but there seems to be some divergence of interpretation between American and English mycologists of the word *cartilaginous*. Ainsworth and Bisby in '*The Dictionary of Fungi*' define it as 'firm and tough but readily bent' and as such it is applied to the stipes of fungi belonging to the old Friesian genera *Marasmius* and *Collybia*. According to the present glossary the word is defined as 'tougher than contiguous tissue but breaking like cartilage when bent; breaking with a snap.'—which is not characteristic of the stipes of these fungi. The dictionary is very comprehensive but as is almost inevitable there are a number of omissions such as the term *euthyplectenchyma* introduced by Degelius (1954) for certain kinds of tissue in the lichen genus *Collema*.

Definitions are also given of the various terms used in taxonomic mycology and these will prove very helpful to both specialists and non-specialists all of whom are liable to become confused on occasion by the multitude of variations on the word 'type'. Few mycologists, without access to a dictionary, could explain the meaning of 'apotype', 'clastotype', 'haptotype', 'homeotype', 'hypoparatype', 'ideotype', 'merotype', 'pesinotype', 'proteromerotype', etc.

Popular names of many fungi and lichens are listed with their Latin equivalents, together with vernacular and obsolete terms. A special feature of this glossary is, however, the listing and equating of the colour terms of Ridgway's '*Color Standards and Nomenclature*', Maerz and Paul's '*Dictionary of Color*', the '*Répertoire des Couleurs*' and Saccardo's '*Chromotaxia*'. This will be greatly appreciated by all those who do not have the advantage of working in large institutions or within easy reach of a good library.

The descriptive part of this dictionary is preceded by fifteen plates with 191 line drawings illustrating various terms. The diagrams are mostly both pleasing and adequate but they also show how terms have been multiplied unnecessarily. For example, the value of distinguishing between '*tibiiform*' and '*lecythiform*' [Plate XI, figs. 18, 19], and between '*lanceolate*' and '*subulate*' [Plate XI, figs. 4, 5] is questionable, especially when it is remembered that the figures are idealized representations of the shapes concerned. The illustrations of '*fimbriate*', '*lacerate*', '*incised*', '*lacinate*' [Plate VII, figs. 3-6] only emphasize the fact that these terms are more or less interchangeable. The portrayal of '*capitate*' [Plate XI, fig. 14] is decidedly misleading and does not conform to the definition in the text as 'having a minute knob at the tapering apex.' The figure quoted should be classed as '*capitate-encrusted*' while figures 17-19 on the same plate give a better idea of a truly capitate structure. The representation of the hymenium of basidia, basidioles, subhymenium and trama [Plate IX, fig. 9] is particularly crude especially with respect to the origin of both basidia and basidioles; likewise the sub lente diagrams of '*subpruinose*', '*furfuraceous*', '*floccose*' and '*subtomentose*' are not very successful.

In conclusion it must be stated that any critical comments are not intended to detract from the merits of the work but are suggestions for improving still further the value of future editions. The publishers claim that 'the *Glossary of Mycology* should be on the reference desk of every mycologist—amateur professional, and industrial', is fully endorsed. It will also prove valuable, to a wide variety of persons other than mycologists, such as those engaged in the manufacture of antibiotics, those employed in agricultural and botanical research, and should be on the shelves of all University libraries.

DEREK A. REID

* A Glossary of Mycology by Walter H. Snell and Esther A. Dick. Cambridge, Mass.: Harvard University Press; London: Oxford University Press, 1957. Pages XIV + 171, 15 plates. Price 40/-.

Amateur Gardening Annual.*—Readers of garden literature will welcome this attractive annual. Nicely printed and illustrated it contains a number of interesting and instructive articles by some of the leading experts of the day. It can confidently be recommended to all who have to deal with gardens, with the assurance that they will not fail to be interested.

H. S. MARSHALL.

* Amateur Gardening Annual. 1958. Edited by A. G. L. Hellyer. Pp. 135. Illus. W. H. & L. Collingridge Ltd. Price 6/-.

Some additions to
Pauridiantha and Bertiera (Rubiaceae)
in West Tropical Africa

F. N. HEPPER

Pauridiantha stipulosa (*Hutch. et Dalz.*) Hepper comb. nov.

Urophyllum stipulosum Hutch. et Dalz. F.W.T.A. ed. 1, 2. 104 (1931).

Pentaloncha (?) *stipulosa* (Hutch. et Dalz.) Bremekamp in Engl. Bot. Jahrb. 71. 226 (1940).

Type: Monrovia, Dukwai River, *Cooper* 37 (lectotype K!).

This species was uncertainly placed in *Pentaloncha* by Bremekamp and although it has longer calyx lobes than most species of *Pauridiantha* I think it really belongs to the latter genus. When the description was published in F.W.T.A. several specimens were cited and I now select *Cooper* 37 as lectotype.

Pauridiantha viridiflora (*Schweinf. ex Hiern*) Hepper comb. nov.

Urophyllum viridiflorum Schweinf. ex Hiern in F.T.A. 3. 74 (1877).

Type: Belgian Congo: Monbuttu-land, near Munsa, *Schweinfurth* (holotype K!).

Pamphlethantha viridiflora (Schweinf. ex Hiern) Bremekamp in Engl. Bot. Jahrb. 71. 227 (1940).

I consider it unreasonable to separate this species from *Pauridiantha* on the single character of a terminal inflorescence, as Bremekamp did when he made the genus *Pamphlethantha*, for there are often axillary inflorescences as well. When this happens (e.g. in *Talbot* 3327) there is no good generic character to separate this species from *Pauridiantha floribunda* (K. Schum. et K. Krause) Bremekamp. Whether this applies to other species assigned to *Pamphlethantha* I am not prepared to say, but it might be pointed out that *P. viridiflora* is the type of the generic name (*vide* Bremekamp *l.c.*).

Pauridiantha ziamaeana (*Jacques-Félix*) Hepper comb. nov.

Urophyllum ziamaeaeum Jacques-Félix in Bull. Inst. Fr. Afr. Noire, Sér. A, 16. 990 (1954).

U. rubens Benth. in Fl. Nigrit. 396 (1849), partly; F.T.A. 3: 73, partly (*Afzelius* s.n.).

Type: French Guinea, Macenta, forest of Ziama, *Jacques-Félix* 1559 (isotype K!).

Bertiera laxa Benth. var. **bamendae** Hepper var. nov.; a *B. laxa* var. *laxa* glabritie omnium partium (rhachidibus exceptis) differt.

Frutex ad 120 cm. alta. *Caulis* (?) singulus; ramulis glabris. *Folia* elliptica vel ovato-elliptica, apice abrupte acuminata, basi cuneata, 10–17 cm. longa, 4–7 cm. lata, nervis lateralibus utrinque 7–8, glabra, supra saturate viridia, subtus pallide viridia. *Stipulae* lanceolatae acutissimae 2–2.5 cm. longae, 7–8 mm. latae, utrinque glabrae. *Inflorescentia* pendula 15–25 cm. longa, laxa, rhacidibus tenuibus (c. 1 mm. diam.), pubescentibus. *Flores* non visi. *Fructus* orbicularis 10-striatus, 5 mm. diam., sparse et minute adpresso-pubescent, 2-locularis, polyspermus; semina angulata, 1 mm. longa, dense tuberculata.

BRITISH CAMEROONS: Bamenda Prov. and Dist.; Bu Forest Reserve; in high forest by stream-side on hill-slope. Amongst *Uapaca* sp., *Strombosia pustulata*, *Khaya* sp. and *Terminalia superba*, fr. 27 April 1951, Ujor FHI 30087 (holotype K!): shrub, stem up to 4 ft. high; immature fruits green, mature fruits bluish; leaves black-green above, pure green beneath, smooth.

This plant is glabrous, which distinguishes it from *B. laxa* var. *laxa* and from *B. maitlandii* Hutch. et Dalz. Only the rhachis of the inflorescence is pubescent.

Soil micro-organisms.*—This little book offers in 165 small pages of text a convenient summary of some recent literature on the occurrence and behaviour of some micro-organisms in soils. The field is far too great to be adequately surveyed on so small a scale and Prof. Burges has chosen to deal principally with the ecological aspects of soil mycology. The text is clearly expressed and the proof reading effective. In spite of the skill with which the author has assembled his material, however, one is inclined to doubt if such a concentrated summary of a complex problem can be very illuminating to the uninitiated. The specialist already largely familiar with the literature will find this a fairly balanced and up to date handbook for ready reference.

R. W. G. DENNIS.

* Micro-organisms in the soil, A. Burges. 188 pp. 10/6. Hutchinson & Co. 1958.

Intelligent Gardening.*—We are told at the beginning of the volume that 'this is a book for those who like to garden and who wish to get the best possible return for every minute and every penny spent'. To obtain such satisfactory results the author suggests a number of time and labour-saving methods which will be useful to those with limited time at their disposal for gardening. Here are given selections of plants, easy to grow, which will amply repay the time spent on their cultivation. There are chapters on weeds, bedding plants, roses, the improvement of site and soil, hardy annuals and perennials, bulbs, shrubs and grass, the last chapter being devoted to garden design. The book contains many good photographic illustrations, and ends with useful tables of weights and measures which are provided in an appendix.

H. S. MARSHALL.

* Intelligent Gardening: A practical guide to labour-saving methods. By F. R. McQuown. Pp. 116. Illus. London: W. H. & L. Collingridge Ltd., New York: Transatlantic Arts Inc. Price 18/-.

Notes on Mimosoideae: V

J. P. M. BRENNAN

The introductory comments made to Part III of these notes apply also to this part (see Kew Bull. 1957, 75 (1957)).

Acacia leucospira Brennan, sp. nov.; affinis *A. edgeworthii* T. Anders. (*A. socotranæ* Balf. f.), ramulis et partibus basalibus spinarum densissime albido-lanatis, leguminibus brevioribus arcte spiratis vel curvatis magis compressis extra more ramulorum vestitis intus oligospermis, seminibus saepius majoribus exareolatis differt.

[*Arbuscula* 1 m. alta, applanata, circiter 2 m. lata.] *Ramuli* juveniles densissime albido-lanati, pilis crispatis epidermidem omnino obtegentibus; [epidermis serius $\pm$ desquamans et lutescens]. *Spinae* stipulares geminae, rectae, paullum sursum adversae vel nonnunquam fere horizontales, 5–15 mm. longae, basi 1.5–3 mm. diametro, apice atrobrunneo excepto more ramulorum persistenter vestitae. *Folia*: petiolus brevissimus vel fere nullus, usque ad 2 mm. longus, supra glandula minima rubescenti circiter 0.1 mm. diametro prope apicem petioli saepe ornatus; rhachis circiter 0.5–1.2 cm. longus, ut petiolus vestitus, eglandulosus; pinnae conferte dispositi, [5–] 6–11-jugi, 2–6 mm. longae, 1–2 mm. latae; foliola in pinnis confertissima et imbricata ut inter sese aegre tantum saepe secernentur, circiter 6–14-juga, oblongo-elliptica, perminima, 0.5–1 mm. longa, 0.25–0.5 mm. lata, supra concava, subtus convexa, apice obtusa, pilis crispatis utrinque dense lanata, costa basi obliqua folioli subcentrali, nervis lateralibus nullis. *Flores* capitati, verisimiliter albi, pedunculis ex ramulis juvenilibus et vetustioribus singulatim vel nonnunquam geminatim exorientibus, 0.7–1.2 cm. longis albo-lanatis, involucellis atrobrunneis margine apicem versus pubescentibus 1–1.5 mm. longis paullum supra basim pedicelli positiss. *Bracteolae* spathulatae, 1.5–2 mm. longae, acutae vel subacutae, praesertim in parte apicali lanatae, basim versus longius pilosae. *Calyx* 2 mm. longus, obpyramidalis, tubo extra dense pubescenti, lobis apice obtusis vel subacutis 0.5–0.75 mm. longis et latis extra lanatis. *Corolla* 3 mm. longa, lobis 0.75–1 mm. longis 0.3 mm. latis extra tomentosis. *Staminum filamenta* circiter 5 mm. longa. *Antherae* 0.2 mm. latae, saltem aliquae glandula caduca apice primo ornatae. *Ovarium* subsessile, glabrum, 0.8 mm. longum, 0.5 mm. latum. *Stylus* glaber, circiter 5 mm. longus. *Legumina* siccitate tenuiter lignosa, satis rigida, [7–] 13–16 cm. longa, 2–2.5 cm. lata, compressa, in spiram [vel curvam] circiter 5–5.5 cm. diametro arcte intorta, densissime albido-lanata, basi apiceque rotundata, 5–6-sperma. *Semina* pro genere maxima, nigra, $\pm$ rotundata, parum compressa, [11–] 15–16 mm. longa, [9–] 12–14 mm. lata, 7–9 mm. crassa; testa puncticulata, fere laevis sed vix nitida, areolis nullis.

SOMALIA. Near Galkayu (Galcaio), 16 Oct. 1951 (fl. & frt.), Bond & Pechanec 65 (EA, holotypus). 170 km. S. of Garoe, on the Galkayu road, 16 June 1958, Hemming 1404:—small bush 1 m. high, 2 m. wide, flat-topped; bark near the ground yellow-papery; growing in gypsum soils with *Cadaba heterotricha*, *Acacia tortilis*, *Commiphora*, etc.

Acacia leucospira is by its mode of growth, woolly corolla, hard, somewhat swollen pods containing large black seeds, and by the general appearance of the plant, evidently related to *A. edgeworthii* T. Anders., of which I consider *A. socotrana* Balf. f. to be a synonym.

A. leucospira differs from *A. edgeworthii* in the very dense white matted woolly covering that invests most parts of the plant including the pods, in the shorter much more compressed few-seeded pods bent into a closer spiral or curve, and in the usually larger seeds lacking areoles. In *A. edgeworthii* the pods are cylindrical when ripe and either straight or curved, but if the latter then with a much more open curve 6–10 cm. or more in diameter. The pods of *A. edgeworthii* are about 6–10-seeded, and the individual seeds are normally smaller, and have two large conspicuous areoles on the sides. Now the absence of areoles from the seeds of *A. leucospira* deserves more than a passing mention, for in this way the seeds differ not only from those of *A. edgeworthii* but from those of all other acacias that I have so far examined—certainly from all those in East Africa—and indeed, with a few exceptions from those of *Mimosoideae* in general. The exceptions that have come to my notice—there are doubtless more—are the genera *Elephantorrhiza*, *Newtonia* and *Piptadeniastrum* and the giant-podded *Entada* species. *Newtonia* and *Piptadeniastrum* have large flattened very broadly winged seeds which are most unusual in the subfamily, while both *Elephantorrhiza* and the *Entada* species have unusually large and turgid seeds—comments which apply also to *A. leucospira*. Whether there is any causal connection between the absence of areoles and unusually large seeds I do not know. Certainly *A. edgeworthii* can have seeds as large as those of the smaller ones of *A. leucospira* and yet show obvious areoles.

Although *A. leucospira* is anomalous in one character otherwise apparently constant in the genus, I am in no way tempted to separate it generically from the remainder of *Acacia*, remembering especially that in *Entada* the seeds of some species have areoles and of others not.

It remains to add that I have examined holotypes of *Acacia erythraea* Chiov., *A. pseudosocotrana* Chiov. and *A. sultani* Chiov., and consider none to be conspecific with *A. leucospira* but all to be synonymous with *A. edgeworthii*.

Ornamental Trees.*—The first edition of this book was published in 1925 and it has been regarded as a standard work on the subject ever since. A new edition has now appeared, revised and brought up to date by Mr. S. A. Pearce, a testimony both to its value and the need for a reliable work on ornamental trees which it creditably fills. The book is divided into seven chapters dealing with cultivation, transplanting, pruning, propagation, care of old trees, the last two giving select and descriptive lists of all ornamental trees likely to be of interest to the amateur gardener. The printing and the photographic illustrations are very good and a useful index completes this interesting book which adequately serves its purpose.

H. S. MARSHALL.

* *Ornamental Trees*. By W. J. Bean. Ed. 2. Revised and enlarged by S. A. Pearce. Pp. 120. Illus. London: W. H. & L. Collingridge Ltd. Price 18/-.

Notes on Mimosoideae: VI

J. P. M. BRENNAN

The Identity and Status of *Acacia heteracantha* and *A. litakunensis***1. Introduction**

In part III of these notes (Kew Bull. 1957, 88: 1957) *Acacia heteracantha* Burch. and *A. litakunensis* Burch. were considered as synonymous with one another, and both were referred to *A. tortilis* (Forsk.) Hayne subsp. *heteracantha* (Burch.) Brenan. The status and identity of *A. heteracantha* and *A. litakunensis* have for some time been a matter of controversy, but I understood then that the problem had been settled and that the two names were to be accepted as synonymous; hence the treatment above.

However, a recent letter from Miss I. C. Verdoorn, of the National Herbarium, Pretoria, South Africa, indicated that the identity of the two species was still anything but certain, and requested reasons for making them synonymous. It seemed therefore necessary that the matter should be investigated again. This was done, and the results are contained in the present paper.

I would like to acknowledge the invaluable help and advice that I have received throughout from Mr. W. Marais, of the National Herbarium, Pretoria, now seconded to the Royal Botanic Gardens, Kew; and from Mr. R. G. Strey, also of the National Herbarium, Pretoria.

2. The descriptions

Both *A. heteracantha* and *A. litakunensis* were first published by Burchell in his 'Travels in . . . Southern Africa'. *A. heteracantha* appeared in 1822 on p. 389 of vol. 1, and was described as follows:—'Arbor 20 pedalis. Coma densa depresso-patens. Ramuli pubescentes. Spinae geminae brevissimae recurvae fuscae, cum aliis pluries longioribus rectis albis. Folia bipinnata pubescentia, 4-6-juga; pinnis 10-14-jugis. Foliola approximata oblonga. Legumen lineare'. The only specimen mentioned is 'Cat. Geogr. 1710.'

A. litakunensis appeared on p. 452 of vol. 2 in 1824—two years after *A. heteracantha*. It was described as follows:—'Arbor 40-pedalis, (vide tabulam sextam) comis partialibus depresso-patentibus. (In plantula hortensi bienni; folia subpubescentia bipinnata 4-6-juga, foliolis interstitio invicem separatis, anguste oblongis, 9-13-jugis. Spinae stipulares geminae breves recurvae.) Legumina bivalvia tortuosa.' Burchell cited under *A. litakunensis* only 'Catal. Geogr. 2205.'

3. The type-specimens

Of *A. heteracantha* Burchell, Cat. Geogr. 1710; of *A. litakunensis* Burchell, Cat. Geogr. 2205. Both these numbers are in Burchell's own herbarium, now at Kew.

Burchell 1710 (*A. heteracantha*) consists of a length of apparently mature twig, without flowers or fruits but, except for the absence of the latter, agreeing quite well with Burchell's description, in indumentum, armature and

leaves. Now this specimen has very short leaves (rhachis to 8 mm.) and in this and also in the proportions and length of the long spines it agrees with the southern subspecies of *A. tortilis* (e.g. Codd 4860, Transvaal, Zoutpansberg) and disagrees with the $\pm$ straight-podded species such as *A. uncinata* Engl., *A. luederitzii* Engl. and *A. gillettiae* Burt Davy. In fact all the evidence provided by Burchell 1710 points to its being indeed *A. tortilis*.

Burchell 2205 (*A. litakunensis*) is a sheet consisting of three sets of specimens collected in 1818, 1819, and 1820, representing stages in growth of the young plants grown by Burchell from seeds of *A. litakunensis*. There are neither flowers, pods nor seeds. It is quite likely that these young plants are *A. tortilis*, although they match none of the specimens at Kew from the region where *A. litakunensis* was first recorded, probably because juvenile material is not often collected. The young plants of 2205 do not show, however, any mixed armature, and the rhachides of their leaves are up to 3 cm. long.

To sum up, the type-specimen of *A. heteracantha* is *A. tortilis* and that of *A. litakunensis* consists of seedlings or young plants probably *A. tortilis* but scarcely identifiable with any certainty without further evidence, which, however, is provided by the mention in Burchell's description of 'legumina tortuosa'.

3. *The relationship between the type-specimens and the descriptions*

There is no discrepancy between the type-specimen of *A. litakunensis* and Burchell's description. Burchell mentions having grown plants from seed and they doubtless are the ones preserved in his herbarium. No material of the original tree of *A. litakunensis* seems to have been preserved.

In *A. heteracantha* there is an important discrepancy. The description says 'legumen lineare' [although Burchell described the pods as linear, he nowhere said they were straight; indeed the comparison with *A. capensis* might imply that they were not], while the type-specimen belongs to a species with twisted pods. There is no evidence of an unintentional muddle over the specimens. The type-specimens of *A. litakunensis* evidently are correctly placed there, and that of *A. heteracantha* agrees with Burchell's description of that species in all ways, *except for the words 'legumen lineare'*.

Now there is an explanation that covers this, and for which there is some significant evidence. At Kew there is Burchell's MS. 'Catalogus Geographicus Plantarum Africae Australis Extratropicae'. The first page has a note: 'This volume is of the utmost importance as it contains many memoranda made on the day [sic] at the time of collecting and not yet copied into the two duplicate volumes, numbered 1 and 2.' Under No. 1710 in this 'Catalogus' there is the following written in dark ink: 'Acacia heteracantha+* (2397, 2402) "Kameel Doorn". Arbor 20 pedalis trunco robusto ramis destituto, diametro saepe sesquipedali—Rami densi patentibus forming an umbrella head. Foliola minuta. This is a tree of picturesque growth and of a much greater size than the Karroo Doorn (1953) ever arrived at which is distinct by being more inclined to form a large shrub whereas this has a thick clear simple stem (frequently crooked) and may be distinguished by its growth half a mile off.'

* This symbol (+) denotes that the name has been printed and published. The other two numbers cited, 2397, 2402, are not conspecific with 1710. They may belong to *A. hebeclada* DC., but lack flowers and fruits.

Underneath the above, separated by a blank line, but above the entry for 1711, there is written in very pale ink 'Legumen Acaciae capensis.' Now on page 4 of the 'Catalogus' Burchell writes that in 1860 he went through the catalogue putting in in pale China ink everything which he then found written only in blacklead pencil, the latter being rubbed out first. Traces of the rubbed-out words can be seen overwritten by 'Legumen Acaciae capensis'.

The above evidence indicates that the comment about the pod of *A. heteracantha* was not written at the same time as Burchell described the type-tree. There is in fact nothing in the Catalogus except the added phrase to indicate that the type-tree was in fruit, and it seems probable that the phrases 'Legumen Acaciae capensis' in the Catalogus and 'Legumen lineare' in the Travels were not derived from the type-tree of *A. heteracantha*, but at some other time, from some other source, and in error. As we have seen, Burchell certainly afterwards collected another species under the name *A. heteracantha*.

4. Conclusions

The type-specimen, and all Burchell's description of *A. heteracantha*, excluding the erroneous words 'legumen lineare', are referable to the southern subspecies of *A. tortilis*, subsp. *heteracantha*, the only one recorded from the type-region of Burchell's species.

There is no serious reason for doubting that *A. litakunensis* is also the southern subspecies of *A. tortilis*.

A. heteracantha, being earlier than *A. litakunensis*, must be used, emended however as above, if the two are combined.

Garden Plants in Colour.*—The author of this work is the well-known editor of 'Amateur Gardening'. As such he is fully aware of the requirements of gardeners and horticulturists and has written many useful books which have greatly contributed to the popularity of gardening and given many hours of pleasure to their readers. 'Garden Plants in Colour' is an Amateur Gardening encyclopedia which makes yet another valuable addition to gardening literature. It contains about 270 plants illustrated in colour from watercolour drawings by Cynthia Newsome-Taylor whose illustrations for another work 'Flowers in Colour', were awarded a Silver Grenfell Medal when exhibited at the Royal Horticultural Society. The detailed line drawings, 230 in number, are by George R. Kingbourn who is himself a keen gardener. All these illustrations have been made from living material. Descriptions of garden and greenhouse plants and their varieties accompany the pictures giving where possible the common English names as well as the botanical names. These will be of great assistance in the selection of beautiful and interesting plants for cultivation in the garden. This book has been aptly described as an 'elaborate picture gallery of good flowers' from which they can be readily identified. It is well-produced and printed, and provided with a useful index to the popular and catalogue names.

H. S. MARSHALL.

* Garden Plants in Colour: an Amateur Gardening encyclopedia. By A. G. L. Hellyer. Pp. 128. 270 coloured illus. and 230 line drawings. London: W. H. & L. Collingridge Ltd. 1958. Price 25/-.

Notes on Mimosoideae: VII

J. P. M. BRENNAN

The introductory comments made to part III of these notes apply also to this part (see Kew Bull. 1957, 75 (1957)).

Acacia ancistroclada Brennan, sp. nov.; ob flores aureos, ovarium glandulosum, et legumina prope *A. seyal* Del. ponenda, sed cortice tandem exfoliante et papyraceo, spinis brevibus omnibus uncinatis, pinnis 1-2-jugis, foliolis 3-8-jugis, leguminibus plerumque angustioribus facile distinguenda.

Frutex vel arbor parva, usque ad 3.6 [-7.5] m. alta, truncis 1 usque pluribus, cortice truncorum et ramorum vetustiorum viridi vel brunneo papyraceo et exfoliante. *Ramuli* juveniles glandulis sessilibus rubidis primo crebris sed mox evanidis exceptis glabri, primo purpurascens, tunc rubro-brunnei vel griseo-brunnei, cortice nisi in ramulis vetustissimis non vel vix desquamante. *Spinae* stipulares geminae, dimorphae, aliae breves, 2.5-7 [-8] mm. longae, brunneae vel serius cinereae, uncinatae, aliae elongatae, (2-) 4-5.8 cm. longae, albae, saepe leviter deflexae, fere rectae vel levisime curvatae, nunquam inflatae. *Folia*: petiolus 2.5-5 [-8] mm. longus; rhachis 0-3 [-8] mm. longus; pinnae 1-2-jugae, 5-7 [-9] mm. longae; glandula parva, rubida, rotundata, 0.2-0.25 [-0.4] mm. diametro inter par supremum pinnarum in rhachide vel sive in apice petioli foliorum unijugorum posita; foliola 3-6 [-9] jugae, oblonga, plerumque 2-5 mm. longa, 0.75-1.5 mm. lata, apice obtusa vel rotundata, glabra vel valde sparse et inconspicue ciliolata, costa subcentrali supra non vel vix cernenda, subtus impressa, nervis aliis haud cernendis. *Flores* aurei, capitati; pedunculi axillares, singuli vel usque terni, valde sparse et inconspicue glandulosi et puberuli, (0.7-) 1.2-2.3 [-2.5] cm. longi, involucello circiter (3-) 5-7 [-16] mm. supra basim pedunculi posito cupuliformi 1.5-2 mm. longo scarioso mox caduco. *Bracteolae* 1.5 mm. longae, ungue angusto tenui 1 mm. longo, apice subito dilatato et incrassato suborbiculari circiter 0.5 mm. diametro puberulo. *Calyx* circiter 1.75 mm. longus, breviter 5-lobatus, lobis late triangularibus puberulis. *Corolla* circiter 2.5-2.75 mm. longa, lobis 5 ovato-triangularibus recurvatis 0.5-0.8 mm. longis apice subacutis marginibus minutissime puberulis exceptis glabris. *Staminum filamenta* 5-6 mm. longa. *Antherae* 0.2-0.25 mm. latae, apice glandula caduca plerumque ornatae. *Ovarium* brevissime stipitatum, 1.7 mm. longum, 0.5 mm. latum, glandulis numerosis sessilibus minutis ornatum. *Stylus* glaber, 5 mm. longus. *Legumina* dehiscencia, papyracea, falcata, linearia, [6-7] usque circiter 11.5 [-15] cm. longa, marginibus leviter crenatis hinc submoniliformia, 'articulis' 4.5-6 mm. latis [8-9]-12 mm. longis, glabra, atrobrunnea, subtiliter et fere longitudinaliter vel aliquot oblique venosa. *Semina* in legumine longitudinalia, elliptica; 6-7 mm. longa, 3-3.5 mm. lata, laevia, olivacea vel olivacea-brunnea, areolis 4.5-5 mm. longis 1.5-2 mm. latis.

KENYA. Masai District: Ngom watercourse near Selengai, 2° 10' S., 37° 15' E., c. 1220 m., 4 Nov. 1948 (young frt.), Vesey-Fitzgerald 214:—on banks of red soil in *Acacia-Commiphora* orchard near watercourse; shrub; bark greeny-yellow with papery peeling; spines short,

paired, reflexed; flowers yellow; young pods purple, smooth, strap-shaped, curved; leaves bipinnate, often with disc-like purple extra-floral nectary. Amboseli, *D. B. Thomas* 628 (EA):—tree or bush, with one to several stems, up to about 3.6 m. high; bark green or brown on old stems, peeling, papery; young twigs grey or reddish-brown; leaves bipinnate, with up to about 9 pairs of leaflets each about 3 mm. long; thorns grey, paired, some short, sharply recurved, about 0.6 cm. long, others straight, up to 6 cm. long, the latter being more common on the older stems; flowers bright yellow, globose, about 1 cm. in diameter, in clusters of 2 or 3, or singly; pods 5–10 cm. long, sickle-shaped, splitting longitudinally; seeds oblong, about 0.5 cm. long, attached to the pod by a thin filament; this species is quite abundant in the Amboseli area in dry grassland in association with *A. mellifera*. Amboseli, common near the entrance to the park from the Loitokitok side, and also in the Namanga area, 1958, *Knight & Thomas* H344/58 (K, holotypus). Masai/Teita Districts: near Mzima Springs, Tsavo National Park, 820 m., 3 May 1952 (frt.), *Trapnell* 2213:—bush resembling *A. kirkii* in habit, with similar thin peeling bark; bark of twigs grey.

TANGANYIKA. Masai District: between Mgera and Kibaya, *B. D. Burt* 4934 (BM). Naberera, fairly common, 9 Oct. 1934 (young frt.), *Hornby* 1106 No. 6:—grows with *Acacia* spp., *Commiphora* spp., *Grewia bicolor*, *Balanites aegyptiaca*, *Salvadora* and *Capparidaceae* below limestone ridge; a few miles from Naberera on reddish-brown soil is more common; 6–7.5 m. high, with branches of almost equal size coming off main stem to within a few feet of ground; flowers very yellow; fruits long and narrow; bark flaking off in large pieces, reddish-yellow. Same locality, *Hornby* H1/36 (EA). Between Longido and Namanga, c. 1310 m., 13 Nov. 1958, *Trapnell* 2431:—in dry thornbush on gritty red soil; bushy, small tree up to about 5.5 m. high; trees rather rounded-obconical in outline, with little trunk to them and a virgate ascendent branch habit; bark thin, papery, peeling off from larger stems in large yellowish translucent sheets, greenish-brown beneath; pods *seyal*-like, with slight constrictions and pendulous seeds when mature. Handeni District?: E. of Loskitu Mt., 18 Sept. 1933, *B. D. Burt* 4916 (BM).

This very distinctive acacia is most ways resembles *A. seyal* Del. except that the armature is like that of *A. tortilis* (Forsk.) Hayne, and the striking, papery-peeling bark is different from both. Material of it has lain in the National Herbaria for some years, but it has been inadequate to serve as the basis for a new species. Very recently, however, thanks to the field-observations and collections made by Mr. C. G. Trapnell, O.B.E., and also by Messrs. J. Knight and D. B. Thomas, the latter kindly communicated by Dr. B. Verdcourt of the East African Herbarium, Nairobi, and supplemented by an excellent colour-transparency of the new acacia, no room for doubt is left about its status. It appears to be locally common over a limited area of dry country on both sides of the boundary between southern Kenya and northern Tanganyika.

The indumentum of the style in the taxonomy of *Tephrosia* in Africa, with notes on *T. virgata*

H. M. Forbes and T. euchroa Verdoorn.

J. B. GILLETT

The species of *Tephrosia* may be divided into two groups by reference to the indumentum of the style. In *glabristyled* species the style itself is glabrous on both sides, although its base, which, as always in the genus, is persistent and becomes the beak of the fruit, is nearly always pubescent and the stigma is often penicillate. In *barbistyled* species the style is pubescent along all or most of its inner (adaxial) face, and often along the outer face as well. This character was used in early attempt to classify the species of *Tephrosia*. Thus De Candolle (1825) has 'stylus lateraliter barbatus' as a character of his section *Brissonia*. Later, however, less importance was attached to the style indumentum. Harvey (1862) omits it from most of his descriptions and hardly uses it in his key. Bentham (1865) belittles it, stating 'stylus barbatus vel nudus occurrit in speciebus coeterum simillimis'. J. G. Baker (1871) does not use it in his key and often omits it from his specific descriptions. Taubert (1894) and E. G. Baker (1926) do not use the character in delimiting sections, series or groups though Baker sometimes mentions it in describing new species. Hutchinson & Dalziel (1928), Burt Davy (1932), Andrews (1952) and Hepper (1958), whose works do not include full specific descriptions, do not use the character at all. The extreme example of this tendency to ignore the style indumentum is provided by Rydberg (1923) who, in 25 pages on the N. American species of *Tephrosia* (*Cracca*), simply says 'style usually glabrous' in his generic description; without mentioning the character further in the delimitation of his sections, his key to species or in his descriptions of old and new species.

In opposition to this dominant tendency to ignore the style indumentum Miss Forbes (1948) makes some use of it in her keys and always mentions it in her specific descriptions. In 1949 C. E. Wood Jr. published an important paper 'The American barbistyled species of *Tephrosia*' in which he maintains that, in America at least, the barbistyled species form a natural group distinct from the glabristyled species. Cronquist (1954) accepts the importance of the character, using it for the first division of his key to the Congo species. He emphasizes its practical convenience as observable in both the bud, the flower, and usually the fruiting stage. He does not, however, go the whole way with Wood, saying 'In America the species with bearded styles and those with the styles merely penicillate have been considered to belong to two natural groups; this treatment does not hold good for the African species as a whole, but for those dealt with here the use of this character does not seem to separate related species'.

In view of this sharp division of opinion among botanists who have studied *Tephrosia*, particular attention has been paid to the style indumentum while

working up the genus for the 'Flora of Tropical East Africa' and it is now possible to give an assessment of its value based on a study of some 150 old-world species.

The following questions seem apposite to such an appraisal.

- (1) Is the character constant within each species?
- (2) Is the character ever too vague to be assessed?
- (3) If pairs or groups of intergrading species occur (species between which introgression may take place) does it ever happen that one member of such a group shows the character while others do not?
- (4) If the character has been used to separate species previously confused, have other characters been discovered to reinforce the distinction, or are these species truly, as Bentham asserts 'coeterum simillimis'?
- (5) Is any species known whose nearest relative differs from it in this character?
- (6) When the genus is divided into two groups by the use of this character do further characters appear which reinforce the division?

The answers to these questions are as follows.

- (1) The amount of indumentum on the style varies in some species, e.g. in *T. interrupta* Hochst. & Steud. ex Engl. where some forms have the style pubescent on both surfaces, others on the adaxial only. Only one instance has been found, that of *T. hockii* De Wild., where barbistyled and glabristyled plants occur in a single species. Here the difference has a geographical basis and has been used to delimit ssp. *hirsutostylosa* (see Kew Bull. 1958: 115).
- (2) In two species, *T. tanganicensis* De Wild. and *T. zoutspanbergensis* Bremekamp, the style is difficult to classify as the indumentum is very scanty.
- (3) Several difficult groups of closely related intergrading species have been found in which introgression may have occurred. Examples are the *T. purpurea*, *T. capensis*, *T. apollinea*, *T. pumila*, *T. canescens*, *T. drepanocarpa* complex and the *T. polystachya*, *T. polystachyoides*, *T. rhodesica*, *T. noctiflora*, *T. villosa* complex, among glabristyled species and the *T. heckmanniana*, *T. elata*, *T. nyikensis*, *T. interrupta* complex among barbistyled species. Only one complex that including *T. hockii*, *T. aurantica*, etc., is split up by the use of the style indumentum as a major character.
- (4) In at least three instances barbistyled have been confused with glabristyled species. *T. interrupta* with *T. dichrocarpa*, *T. longipes* with *T. linearis* ssp. *discolor* and *T. reptans* with *T. purpurea*. However in each case the resemblance has been found to be superficial and the species are found to differ in many ways, when carefully studied.
- (5) The species most closely related to the barbistyled *T. lebrunii* appears to be the glabristyled *T. aurantiaca*. Here we are dealing with the same exceptional *T. hockii*, *T. aurantiaca* complex mentioned under (1) and (3) above.
- (6) It has not been possible to find another character which is completely correlated with style indumentum but several show a partial correlation.

For example Miss Forbes (1948) recognises 4 sections among the S. African species

A of 9 species with simple leaves: all have glabrous styles (*T. virgata* an apparent exception is dealt with later)

B of 3 species with palmate or digitate leaves: all have glabrous styles

C of 38 species with pinnate leaves and narrow stipules: of these 25 have glabrous and 12 bearded styles while *T. zoutpansbergensis* is doubtful.

D of 17 species with pinnate leaves and broadly ovate or cordate stipules: all have bearded styles.

Thus three of Miss Forbes' four sections, although defined on leaf characters only, are homogeneous for style indumentum.

All species with 1-seeded pods and all species with the flowers wholly axillary have glabrous styles.

The flowers of barbistyled species tend to be larger than those of glabristyled species. Thus in the 28 glabristyled species in British East Africa the length of the filament sheath ranges from 2-13 mm.; in only four of these, including *T. aurantiaca*, is it 9 mm. or more. In the 21 barbistyled species from the same area the length of the filament sheath ranges from 5-19 mm., being under 9 mm. in only 3 of these. Among the 36 S. African glabristyled species recognised by Miss Forbes the length of the standard ranges from 2-21 mm., 5 only having a standard exceeding 13 mm. Among the 28 barbistyled species (excluding *T. virgata*) standard length ranges from 8-22 mm., only two having a standard under 13 mm.

Glabristyled species tend to predominate in dry; barbistyled in wet areas. Thus all 7 Egyptian species are glabristyled. In tropical Arabia there are 14 glabristyled and one barbistyled species, the latter (*T. elata*) growing at 2000 m. in the Yemen, the least arid part of the area. In British East Africa 27 glabristyled and 21 barbistyled species with known areas of distribution occur. The correlation between these areas and rainfall may be expressed as follows.

Annual rainfall.	No. of glabristyled species.	No. of barbistyled species.
200- 600 mm.	7 (87%)	1 (13%)
600-1000 mm.	25 (63%)	15 (37%)
1000-1500 mm.	17 (50%)	17 (50%)
over 1500 mm.	2 (28%)	5 (72%)

In dry South West Africa and Bechuanaland there are 15 glabristyled and 3 barbistyled species: in relatively humid Natal and Zululand 11 glabristyled and 18 barbistyled species occur.

After investigating the facts which are summarized above, two further species of *Tephrosia*, *T. virgata* and *T. euchroa*, attracted attention as apparent exceptions to the generalisations about the value of the style indumentum character outside the *T. aurantiaca* complex and the characteristics of the two groups into which the rest of the genus may be divided by the use of this character.

(1) *T. virgata* H. M. L. Forbes, Bothalia 4: 956 (1948) is described as having a bearded style. But the flowers are all axillary, the leaves simple and the

standard only 4 mm. long. Furthermore the type, the only specimen known, comes from an arid area on the Limpopo west of Messina, c. 29° 23' E. This species is thus highly anomalous in the barbistyled group. Miss Sheila Johnson has very kindly examined the type in the Natal Herbarium and finds it in fact to have glabrous styles. Miss Johnson states that *T. virgata* is very closely related to, but not identical with, the likewise glabristyled *T. schweinfurthii* Deflers from Arabia and Somaliland.

(2) The original description of *T. euchroa* Verdoorn, Bothalia 3: 239 (1937) does not mention the style indumentum, but Miss Forbes (1948), 969 describes the style as glabrous. The standard is 15–20 mm. long, unusually large for a glabristyled species, and an isotype at Kew has pubescent styles. Thus *T. euchroa*, although certainly not related to the *T. aurantiaca* complex, appears at first sight to be a second instance where the style indumentum is of little value.

Miss Boegman at Pretoria has kindly examined the holotype there and finds that it is in fact barbistyled. Thanks to the co-operation of the authorities at Pretoria in supplying duplicates and specimens on loan it has been possible to examine the following 9 specimens, all from the N. Transvaal which have been identified as *T. euchroa*, those marked ** are cited by both Miss Verdoorn and Miss Forbes, * by Miss Forbes only. These specimens fall into 3 groups.

- A. Obermeyer, Schweickerdt & Verdoorn 73 ** isotype, Schweickerdt & Verdoorn 529 **, Codd & De Winter 5562, Acocks 16762, Smuts & M. G. Gillett 4080 PRE, the last two specimens showing young fruit.
- B. Miss E. Mason s.n.*, Rogers 23664 PRE*, Pole Evans 4306 PRE all showing young fruit.
- C. Young in Moss 14565 BM*.

Although groups A. and B. agree in general aspect, leaflet shape and silvery indumentum they differ in the following 14 points and further differences might have become apparent had it been possible to examine mature seeds.

A	B
1. Leaflets 3–8-jugate.	Leaflets 1–2-jugate.
2. Leaf rhachis up to 9 cm. long.	Leaf rhachis under 2.5 cm. long.
3. Leaflets not, or hardly, recurved at the tip.	Leaflets strongly recurved at the tip.
4. Leaflets widest at, or below, the middle.	Leaflets widest above the middle.
5. Fruiting pedicel 4–5 mm. long.	Fruiting pedicel under 3 mm. long.
6. Standard silky with appressed parallel hairs.	Hairs on standard $\pm$ erect, stiff and irregular.
7. Shorter $\pm$ golden hairs present on standard between the longer white hairs.	All hairs on standard white.
8. Standard 15–20 mm. long, 10–12 mm. wide, not emarginate, gently upcurved near the base.	Standard c. 12 mm. long, c. 10 mm. wide, emarginate, sharply upcurved near the base.

- | | |
|--|--|
| 9. Tip of keel $\pm$ upright (lower margin curved through c. 105°). | Tip of keel pointing inwards (lower margin curved through 150°). |
| 10. Filament sheath 9–11 mm. long. | Filament sheath 6–7 mm. long. |
| 11. Dorsal filament slightly and gently widened, not abruptly thickened or bent near the base. | Dorsal filament abruptly widened, thickened and bent near the base. |
| 12. Anthers c. 1 mm. long. | Anthers c. 0.7 mm. long. |
| 13. Style pubescent throughout, 6–10 mm. long. | Style glabrous except for the penicillate tip, c. 4 mm. long. |
| 14. Pod c. 5 mm. across, up to 6.5 cm. long, 7–10-seeded. | Pod c. 3.5 mm. across, under 4 cm. long, 6–7-seeded (ovules c. 11). |
- A. is clearly the true *T. euchroa* Verdoorn, it is closely related to *T. reptans* Bak. from which it differs in the indumentum and the longer style.
- B. is a completely different species related to the *T. capensis* or the *T. polystachya* complex and is described as *T. limpopoensis* below.
- C. is an imperfect specimen of some other glabristyled species with more numerous leaflets and a longer denser indumentum on the ovary than B.

It is thus possible to draw up the following tentative conclusions.

(1) One group of closely related Tropical African species of *Tephrosia*, including *T. aurantiaca*, *T. hockii* and *T. lebrunii* is divided unnaturally if the presence or absence of style indumentum is used for the basic division of the genus. This group is remarkable for its large orange flowers with the keel pubescent on the suture and the prominently reticulate venation of its leaflets.

(2) When the *T. aurantiaca* complex has been put aside, the remaining African species may be divided by the presence or absence of the style indumentum into two apparently natural groups, which differ, broadly speaking, though not absolutely, in flower size and ecological preferences as well as in style indumentum.

Two species, *T. virgata* and *T. euchroa*, which appeared to constitute exceptions to these generalisations actually illustrate their value, since their application has led to the correction of errors in earlier work carried out in ignorance of the importance of the style indumentum.

****T. limpopoensis* Gillett sp. nov.**

T. griseolae M. M. L. Forbes affinis, a qua floribus minoribus, foliolisque minoribus, apice valde recurvatis, differt.

Suffrutex lignosus ad 1 m. altus (radice haud visa), caulibus junioribus dense subpatente albo-strigosis, caulibus vetustioribus corrugoso-griseo-corticatis. Stipulae albo-strigulosae, triangulario-subulatae, ad 4 mm. longae; rhachis folii ad 2 cm. longa, albo-strigosa, ultra foliola lateralia 0–2 mm. prolongata; foliola 3 vel 5, ad 2.6 cm. longa et 6 mm. lata, cuneato-

oblanceolata, apice valde recurvata, supra glabra, infra sparse strigosa, nervis primariis utrinque 5-6. Flores in axillis foliorum superiorum et in racemis terminalibus brevibus pauci-nodosi dispositi. Bractae triangulariae, c. 2 mm. longae; pedicelli albo-pubescentes 2-3 mm. longi. Calyx albo-pubescentis, tubo c. 2.5 mm. longo, dentibus triangulari-acuminatis, 2 superioribus ad mediam coalitis, 3 inferioribus c. 3 mm. longis. Vexillum supra unguem 2 mm. longum abrupte recurvatum, lamina auriculata, extus patente albo-pubescentis, apice emarginata, c. 8 mm. longa, 10 mm. lata. Alae glabrae, c. 10 mm. longae. Carina glabra, 3 mm. unguiculata, lamina auriculata 4.5 mm. longa, apice incurvata (margine inferiore per 150° curvata). Filamentum dorsale fere liberum, 1 mm. supra basin valde et abrupte expansum curvatumque; filamentorum aliorum pars connata c. 6 mm., partes liberae c. 2 mm. longae. Anthera 0.5 mm. longa. Ovarium pubescens, c. 5 mm. longum, c. 11-ovulatum. Stylus glaber, prope basin per 100° curvatus, deinde rectus, c. 4 mm. longus, basin 0.6 mm. latus, apice 0.3 mm. latus, incurvatus, stigmatibus pubescentibus. Legumen immaturum 4-7-spermum, ad 3.5 cm. longum, c. 3.5 mm. latum, sparse appresseque strigulosum pilis 0.4 mm. longis, rostro dorsale recto, angulo apicale c. 40°.

SOUTHERN RHODESIA. Gwanda district: 3 Km. from Beitbridge on W. Nicholson Rd., in *Colophospermum mopane* bush, shrublet 0.6-1 m. tall, flowers lilac, 15 Feb. 1955, *Exell, Mendonça & Wild* 413 BM.

TRANSVAAL. Zoutpansberg div.: Messina, 600 m., June 1917, *F. A. Rogers* 23664 PRE type. Dongola reserve (c. 45 Km. W. of Messina), April 1943, *Pole Evans* 4306. Middleburg div.: Waterval Boven, 1400 m., *Miss E. Mason* s.n.

References

- F. W. Andrews (1952), Flowering plants of Anglo-Egyptian Sudan 2: 234-241.
 E. G. Baker (1926), Leguminosae of Tropical Africa 170-215.
 J. G. Baker (1871), in Oliver, Flora of Tropical Africa 2: 104-126.
 G. Bentham (1865), in Bentham & Hooker, Genera Plantarum 1: 497.
 J. Burt Davy (1932), Manual of the Flowering Plants of the Transvaal 2: 375-379.
 A. Cronquist (1954), Flore du Congo Belge 5: 85-117.
 A. P. De Candolle (1825), Prodrômus 2: 248.
 H. M. L. Forbes (1948), A revision of the South African species of the genus *Tephrosia*, Bothalia 4: 951-1001.
 W. H. Harvey (1862), in Harvey & Sonder, Flora Capensis 2: 203-211.
 F. N. Hepper (1958), in Hutchinson & Dalziel Flora of West Tropical Africa 2nd edn. 1: 527-531.
 J. Hutchinson & J. M. Dalziel (1928) Flora of West Tropical Africa 1: 383-385.
 P. A. Rydberg (1923), North American Flora 24: 157-183.
 P. Taubert (1894), in Engler & Prantl Nat. Pflanzenfamilien 3: 3: 269-270.
 C. E. Wood, Jr. (1949), The American barbistyled species of *Tephrosia*, Rhodora 51: 193-231, 233-302, 305-364, 369-384.

Contributions to the Flora of Tropical America: LXIV*

Studies in Bignoniaceae, XXIII†: *Odontotecoma* and *Memora fulgens*

N. Y. SANDWITH

The principal taxa discussed in this paper, with their main references, are as follows:

Odontotecoma *Bur. et K. Schum.* in Mart. Fl. Bras. **8**, pars 2, 305 (Febr. 1897); K. Schum. in Engl. et Prantl, Pflanzenfam., Nachtr. **1**, 303 (Oct. 1897); Post et Kze., Lex. Gen. Phan. 396 (1903); Dalla Torre et Harms, Gen. Siphonog. 466, no. 7711 (1904); Urban in Ber. Deutsch. Bot. Ges. **34**, 753 (1916); Lemée, Dict. Gen. Phan. **4**, 812 (1932) and **5**, 28 (1934); J. C. Gomes Jr. in Arquivos do Serv. Florestal, **9**, 284 (1955).

O. fulgens (*Mart. ex DC.*) *Bur. et K. Schum.*, l.c. 306.—*Tecoma fulgens* Mart. ex DC. Prodr. **9**, 222 (1845), pro maxima parte.

Memora fulgens *Bur. ex K. Schum.* in Engl. et Prantl, Pflanzenfam. **4**, **3B**, 225 (1894); *Bur.* in Kjoeb. Vidensk. Meddel. for 1893, 106 (1894), nomen, excl. syn. *Tecoma fulgens* DC.; *Bur. ex Bur. et K. Schum.* l.c. 260 (1897); Glaziou, Liste, in Mém. Soc. Bot. France, **1**, Mém. 3, 523 (1911); Urban, l.c. 750–751; A. Sampaio in An. Prim. Reun. Sul.-Amer. Bot. **3**, 158–159 (1938).—*Tecoma fulgens* Mart. ex DC. l.c., pro minima parte.

M. fulgens *Bur.* var. ***elongata*** *Bur.* in Kjoeb. Vidensk. Meddel. l.c. 106; *Bur. ex Bur. et K. Schum.* l.c. 261; Glaziou, Liste, l.c.

Adenocalymma cymbalum (*Cham.*) *Bur. et K. Schum.* l.c. 112 (1896).—*Bignonia cymbalum* Cham. in Linnaea, **7**, 716 (1832).

Odontotecoma was described by K. Schumann (joint authorship with Bureau being purely nominal) in Martius's Flora Brasiliensis as an extraordinary monotypic genus of the Tribe *Tecomeae*, presenting a unique combination of characters: a climbing habit with bifoliate leaves and tendrils; a dense lepidote indumentum, especially on the branchlets, inflorescence and calyx; a large red (*punicea*) corolla with elongate tube and very broad limb; a narrowly linear, flattened, loculicidal capsule; and seeds with white, membranous, shining wings. He placed it next to *Dolichandra* Cham. and *Parabignonia* Bur., the only other scandent genera among the American representatives of the *Tecomeae*. Since then, Kuntze has reduced

* Continued from Kew Bull. 1958, 170 (1958).

† Continued from Mem. New York Bot. Garden, 10, 142 (1958).

both *Parabignonia* and *Odontotecoma* to *Dolichandra*, but Lemée (l.c. supra, vol. 5) has dissented on account of the included (not exerted, as in *Dolichandra*) stamens of both genera. Urban (l.c.), in his classic paper on the tendrils and pollen-grains of genera of *Bignoniaceae*, listed *Odontotecoma* as unknown to him and could say nothing about it; and the same was confessed by J. C. Gomes, Jr., in his recent paper (l.c.) on the classification of Brazilian *Bignoniaceae*. No-one since Schumann, so far as I know, has ever claimed to have understood or to have re-collected *Odontotecoma*, and for me it has remained a mysterious *tertium quid*. The holotype material of *O. fulgens* (Mart. ex DC.) Bur. et K. Schum., collected in Bahia by Martius (no. 1853), is in the Munich Herbarium. It was photographed in 1932 by Mr. J. F. Macbride for the Chicago Natural History Museum, the Negative No. given on a ticket left on the sheet being 20489, and has recently been lent to Kew for study.

This material, a single sheet, was first described by De Candolle, Prodr. 9, 222 (1845), as *Tecoma fulgens* 'Mart! herb. et mss.', De Candolle using the name '*Tecoma* (*Odontecoma*) *fulgens* Mart.' on Martius's printed label and the copious field notes, some of which are in Martius's hand on the same label while a fuller, slightly different version has been copied from one of his field note-books by A. Progel and appears on a separate ticket. De Candolle has incorporated some of these manuscript notes in his description, particularly those relating to the corolla. Bureau has written nothing on this sheet, but Schumann has written on a separate ticket, '*Odontotecoma fulgens* B. et Sch. a *Memora fulg. toto coelo diversa*'. De Candolle's handwriting is not on the sheet.

The material on the sheet consists of two completely discordant elements, two portions of branchlets which have been mounted in such a way as to look as if they joined at their base. These branchlets belong to different tribes of the family! Small wonder, then, that *Odontotecoma* has not been re-collected, and that no subsequent student has been able to interpret it.

The stouter, left-hand, branchlet is leafless, bearing at its apex a strongly rufous-lepidote inflorescence with 2 flowers (one detached) and a capsule. This specimen, in the Tribe *Tecomeae*, is a *Tabebuia* which I should identify with *T. roseo-alba* (Ridley) Sandwith. De Candolle's description of the bracts, pedicels, calyx, capsule and seeds, also his opening description of the corolla as '*Infundibuliformi extus minutissima* [*sic*: presumably minutissime] *lepidota*' are taken from this element.

The more slender, right-hand, branchlet shows a single bifoliate leaf with two leaflets (one detached) and a glabrous inflorescence with a single surviving flower with calyx and corolla. A strip round this branchlet bears the printed figure 64. This specimen, in the Tribe *Bignoniaceae*, belongs clearly to that species of *Adenocalymma* which was referred to *Memora*, as *Memora fulgens*, by both Bureau and Schumann, and which I can now identify with *Adenocalymma cymbalum* (Cham.) Bur. et K. Sch.

Finally a packet on the sheet contains fragments from the *Tabebuia*, including portions of a third flower which was still attached to the branchlet when the Chicago photograph was taken.

The confusion of two elements began, not merely with the mounting, but on the original field notes on the sheet, where the habit is described as

'frutex arborescens scandens' on the ticket with field-notes (copied by Progel) and as 'arbuscula scandens' on the printed label of Martius's journey. No mention is made of leaves in these notes. The words 'Cal. cylind. dentib. obtusis' apply to the *Tabebuia*. The description of the corolla, quoted by De Candolle in the second half of his description of *Tecoma fulgens*, as 'punicea tubo intus flavo, macula flava in cujusvis laciniae basin radiatim desinente', can apply to *Tabebuia roseo-alba* whose corolla varies from white to pink or violet, with tube yellow within and with yellow blotches at the base of the lobes. The words 'capsula compressa teres' apply to the *Tabebuia*. Nothing in Martius's manuscript notes applies clearly to the second element on the sheet, the *Adenocalymma*, except the word 'scandens'. The material was collected in September, 1818, in the province of Bahia, 'in silvis Catingas inter Malhada et Caiteté', and *Tabebuia roseo-alba* is known to occur in the province of Bahia.

De Candolle has apparently described the leaves and leaflets of *T. fulgens* from the second, *Adenocalymma*, branchlet, but in the second half of the description he has given the measurements of the leaflets as nearly 4 inches long and 2 inches broad, whereas the two leaflets on the Munich sheet are much smaller than this, being less than 3 inches long and only 1-1½ inches broad. This discrepancy is explained by the presence of fragments of *Tecoma fulgens* in the De Candolle Prodrumus Herbarium at the Conservatoire Botanique at Geneva. Prof. C. Baehni kindly reported to me that the fragments, which are in a packet ('capsule') on a sheet, bearing the name in De Candolle's handwriting but without locality, consist of some seeds and two leaflets, and his measurements of the leaflets agree with those of De Candolle's description. It is clear, from further information kindly given me by Mlle. Simone Vautier, that the fragments in the Prodrumus Herbarium represent both elements of Schumann's *Odontotecoma*. The seeds are those of the *Tabebuia*, and match seeds of *T. roseo-alba* from Ceará (leg. Ducke 2383) which I sent to Geneva for comparison. The leaflets, except for their larger size, are an excellent match, according to Mlle. Vautier, with a leaflet sent on loan from one of the sheets of *Martius* 1057, from Minas Gerais, a gathering which is certainly conspecific with the *Adenocalymma* element of *Odontotecoma*, and which I discuss below. What is not certain is whether De Candolle detached these large leaflets from the holotype of his *Tecoma fulgens*, or whether he took them from one of the sheets of *Martius* 1057, forgetting that the material on these sheets belonged to a different gathering. I think the latter most likely, since there is no obvious sign of anything having been removed from the holotype. De Candolle, I learn, did not visit Munich: the *Bignoniaceae* of Martius were sent on loan to him at Geneva.

Schumann's failure to notice the presence of two elements on the sheet of his holotype of *Odontotecoma* is all the more extraordinary when we remember his own realisation of the confusion of two totally distinct species under the same name, *Tecoma* (*Odontotecoma*) *fulgens*, on Martius's labels. His description, with the exception of the foliage, is taken from the stout *Tabebuia* branch, and he completely failed to notice how wholly distinct were the calyx and corolla of the flower on the *Adenocalymma* branch. Yet he compared the corolla of *Odontotecoma* with that of *Adenocalymma cymbalum*, with which that branch must be identified, and even suggested that *A. cymbalum* might prove to be a second species of *Odontotecoma*. He spoke of the material

on the sheet as consisting of a solitary branch 3 mm. in diameter at the base, evidently regarding the specimen of *Adenocalymma* as a slender branchlet arising from its base, as indeed appears. Noticing the small additional scar present at the meeting point of the two petiolules of the leaf of that branchlet, he rightly assumed the almost certain existence of a former tendril, whereas De Candolle had described the leaves of *T. fulgens* as without tendrils. Schumann's measurement of the capsule as 11 cm. is, I consider, a misprint, or a slip, for 21 cm.: there are many such mistakes in this volume of the *Flora Brasiliensis*.

The next stage in this curious story is concerned with the plant described in the *Flora Brasiliensis* as *Memora fulgens*. There are two other sheets of Martius's collection at Munich bearing the names 'Tecoma (Odon-Tecoma) fulgens Mart.' and 'Tecoma (Odontotecoma) fulgens Mart.' respectively on their printed labels. Both represent the same gathering and the same taxon coming from virgin forest near the 'praesidium St. Joan Baptista' in the province of Minas Gerais, gathered in April 1818, as Martius's no. 1057 (this number appears on the label of only one of the two sheets). On the principal sheet, showing inflorescence and with the collector's number on the label, a ticket bears several lines of notes (copied from Martius's field notebook by Progel) including the description of the corolla as 'aurea pulchra limbo flavo versus tub.', and concludes, 'Eadem species est nr. 1853'. It is thus clear that Martius himself did not realise that his no. 1853, which became the holotype of *Tecoma fulgens* and *Odontotecoma fulgens*, was a mixed gathering, mixed either in the field or else later when material was being sorted and labelled. It is equally certain that his no. 1057 and the *Adenocalymma* branchlet of no. 1853 are conspecific, and it is rather significant that the species represented by that branchlet has not yet been collected in Bahia, and seems to be localised round Rio de Janeiro and in Minas Gerais. The main sheet of no. 1057 bears a strip with the printed figure 63, the second sheet a strip with the figure 65, and it will be remembered that no. 1853 showed the figure 64 on the strip attached to the *Adenocalymma* branchlet. These numbers, I am told by Dr. H. Heine, formerly assistant at the Munich Herbarium, bear little relevance to this question, referring only to a systematic catalogue of the Herbarium, which is now discontinued. Once again, there is no handwriting of De Candolle on the sheets of no. 1057, but Schumann evidently thought that he had compiled his description of *Tecoma fulgens* from the two gatherings, 1853 and 1057. This is by no means certain, since the foliage of the main sheet of 1057 bears three obvious tendrils and the inflorescence is in complete disagreement with De Candolle's description: moreover, De Candolle cited only the Bahia material (1853). Nevertheless, as I have already suggested, the large measurements of the leaflets given by De Candolle may conceivably have been derived from the sterile second sheet of the Minas Gerais gathering which shows several trifoliolate leaves, all without tendrils and with leaflets reaching nearly the same dimensions. This second sheet, though obviously part of no. 1057 because of the legend 'Min. Ger. April 1818 [sphalm. "1817" or "1819"]' on the printed label, bears no number on that label. In any case, De Candolle followed Martius and preceded Schumann in being misled by the composite nature of the material of no 1853.

We now have to consider what Schumann and his nominal French

collaborator, Bureau, did with the taxonomy of the Minas Gerais plant, no. 1057. A separate ticket on the main sheet has the following, in Bureau's handwriting: 'Memora fulgens Bur. Tecoma (Odontotecoma) fulgens Mart. herb., non Tecoma fulgens DC.'; and Schumann has added a note of exclamation and his signature. This sheet was photographed by Mr. Macbride, and the Chicago Negative No. is 20485. In 1894, Bureau contributed the account of *Bignoniaceae* to Warming's 'Symbolae ad floram Brasiliae centralis cognoscendam', in which he listed the extensive collections of Glaziov. This was published at Copenhagen in the Videnskabelige Meddelelser for 1893, and on p. 106 Bureau cited two Glaziov numbers, 2642 and 8208, under *Memora fulgens* Bur., of which he gave as synonyms, '*Tecoma (Odontotecoma) fulgens* Mart. in herb. monac.; *Tecoma fulgens* DC. Prodr. IX, 222'. No description was given to the species, but Bureau added a new var. *elongata* with a description, 'foliis bipinnatis, foliolis plerisque elliptico-lanceolatis', based on Glaziov 9967.

I borrowed all these specimens of Glaziov from the Copenhagen Herbarium and found that Bureau had written on the sheets of both nos. 2642 and 8208, 'Non Tecoma fulgens DC.', just as he had done on the main sheet of *Martius* 1057 at Munich. It is thus evident that when, in 1894, he placed *T. fulgens* DC. in the synonymy of *Memora fulgens* Bur., either he meant '*T. fulgens* DC. ex parte', or else the preceding word *non* was inadvertently omitted. He was *not* intending to make a new combination *Memora fulgens* (DC.) Bur. The Glaziov specimens are conspecific with the material of *Martius* 1057 at Munich, and Bureau was surely adopting *Martius*'s manuscript epithet *fulgens* for a new taxon in *Memora* to which, however, he gave no description. The name was barely given valid publication in the same year by Schumann, who placed *M. fulgens* Bur. in his key to Section *Eumemora* of *Memora*, in Engler and Prantl's *Pflanzenfamilien*, **4**, **3B**, 225 (1894). But in 1897 the species *Memora fulgens* Bur. was fully established by Schumann with a long description in the *Flora Brasiliensis*, **8**, pars 2, pp. 260-261, with citation of *Martius* 1057, Glaziov 2642 [sphalm. 2042] and 8208, and several other collections, and an accompanying note explaining the confusion of two wholly distinct plants under *Tecoma (Odontotecoma) fulgens* Mart. Schumann used the synonym '*Tecoma (Odontotecoma) fulgens* Mart. Ms. in Herb. Monac., apud Pyr. DC. Prodr. ix. 222 (ex p.)'.

Why did Bureau and Schumann place this plant in the genus *Memora*? The leaves were described as trifoliate, or bifoliate with a tendril, and Schumann admitted that the large number of ovules in each loculus of the ovary was abnormal for this genus. Urban (l.c., 750-751) kept it in *Memora*—which he regarded as heterogeneous—in a group of species with pollen-grains spherical and unfurrowed, as in *Adenocalymma*; and so did Dr. A. Sampaio, in his review of *Memora* in *Anais da Primeira Reunião Sul-Americana de Botânica*, **3**, 158-159 (1938). The specimens clearly belong to that group of species of *Adenocalymma* with leaflets drying a dark lead colour and with pale cartilaginous margins. This group includes such species as *A. impressum* (Rusby) Sandw., *A. bracteolatum* DC. and *A. marginatum* (Cham.) DC. In such a position the number of ovules (36) in each loculus is no longer unusual. This plant, in fact, is obviously to be identified with *Adenocalymma cymbalum* (Cham.) Bur. et K. Sch., well described by Schumann himself, though unfortunately placed in his Section *Hanburyophyton*. This species

appears to occur locally in the neighbourhood of Rio de Janeiro and must be very showy when in flower, with its elongate racemes, long pedicels, large tubular-campanulate calyces and orange-yellow corollas. I have examined a photograph (Chicago Negative No. 18482) of the unique holotype (*Sellow* 1613) of *Bignonia cymbalum* Cham., formerly in the Berlin Herbarium and now destroyed, and there can be no doubt of the identification. The specimens of *Pohl* 6101 (the other collection cited in the *Flora Brasiliensis*) in the Vienna Naturhistorisches Museum Herbarium have also been labelled *A. cymbalum* by Schumann himself. The Vienna specimens are in obvious agreement with all the specimens of *Memora fulgens* discussed above and also with the *Adenocalymma* element of *Odontotecomma fulgens*. There is even at Munich a duplicate from Vienna of the Pohl gathering (without number, ex Herb. Zuccarini) which has been written up by Bureau as *Memora fulgens* Bur. and confirmed by Schumann. In the Martius Herbarium at Brussels there are apparently none of Martius's own specimens of either element of *Tecoma fulgens*, but there are five sheets of *Memora fulgens* Bur., all so labelled by Bureau himself: these are *Pohl* 6021 ('in monte Corcovado, fl. Febr. 1818'); *Peckolt* 133, 220 and 522, all from Cantagallo; and *Glaziov* 2042. At Kew there are two sheets of this species collected at Rio de Janeiro long ago by Mrs. Graham and formerly in Hooker's herbarium; also *Burchell* 1862, a sterile specimen collected along the Aqueduct of Carioca, Rio, in January 1826. Up to the time of writing I have not seen the fruit and seeds of *A. cymbalum*.

The reason for the placing of *M. fulgens* in *Memora* is partly to be sought, I think, in the identity of Bureau's var. *elongata*, which was adopted and given valid publication in the *Flora Brasiliensis*. I have examined the Copenhagen type material (*Glaziov* 9967, without locality), and it is certain that it represents a taxon wholly distinct from the cited *Glaziov* specimens of *Memora fulgens* Bur. This material has a spathaceously split calyx and bipinnate leaves with leaflets mostly much larger and narrowly elliptic, not verruculose above, and not with a pale, thickened, cartilaginous margin, as in true *M. fulgens*. In fact, *Glaziov* 9967 is a true *Memora*, belonging to the critical group of forms centred round *M. schomburgkii* (DC.) Miers. Its calyx is glabrous, up to 1.5 cm. long, while the bracteoles are very short and broadly ovate, less than 2 mm. long. The corolla is about 5.5 cm. long, with the limb about 3 cm. in diameter. I think we may assume that the unfortunate assignment to the genus *Memora* of the plant which we must now call *Adenocalymma cymbalum* was due to the mistaken association with it by Bureau of the specimen which he named *M. fulgens* var. *elongata*, and also to the influence exercised on Schumann when he found that Bureau had written the name *Memora fulgens* Bur. on the sheet of *Martius* 1057 at Munich. Schumann himself did not, so far as I can see, examine the Copenhagen sheets which Bureau referred to *M. fulgens*, and in the *Flora Brasiliensis* he concludes the description of var. *elongata* Bur. with the significant words '(ex auctore)'.

To sum up, *Odontotecomma* (monotype species, *Odontotecomma fulgens* (Mart. ex DC.) Bur. et K. Sch.) is a false genus based on two wholly discordant elements in distinct tribes of the *Bignoniaceae*. One element, which constitutes the major part of De Candolle's and Schumann's descriptions, if we except the climbing habit and the foliage, is *Tabebuia roseo-alba* (Ridley) Sandw.

The other element is *Adenocalymma cymbalum* (Cham.) Bur. et K. Sch. (*Memora fulgens* Bur. ex K. Sch.). The names *Tecoma fulgens* and *Odontotecoma fulgens* must be rejected, as a source of confusion and error. The epithet *fulgens*, therefore, although antedating *roseo-alba* in *Tabebuia*, must not be used for the species identified with the major element of *Odontotecoma fulgens*. Martius used the manuscript name *Tecoma* (*Odontotecoma*) *fulgens* to cover another gathering which now proves to be conspecific with the second element of *Odontotecoma fulgens*. This gathering was wrongly placed in the genus *Memora* by Bureau and Schumann, and was named *Memora fulgens* Bur. ex K. Sch., which becomes a synonym of *Adenocalymma cymbalum*. *Memora fulgens* Bur. ex K. Sch. var. *elongata* Bur. ex K. Sch. is a true *Memora*, in the group of forms centred round *M. schomburgkii* (DC.) Miers.

I could never have attempted to unravel this intricate problem if I had not been able to assemble at Kew the relevant specimens in the Herbaria of Munich, Vienna (Naturhistorisches Museum), Copenhagen and Brussels, by the kindness of the authorities of these institutions. It goes without saying that the Chicago phototypes prepared from Mr. Macbride's photographs have been of great help to this study. I wish also to thank Prof. Charles Baehni and Mlle. Simone Vautier, of the Conservatoire Botanique, Geneva, for their assistance; and Dr. H. Heine, for his interpretations of handwritings and for other information connected with the specimens lent from Munich.

Simple Propagation.*—This is a revised edition of a useful little book first published in 1950 which will be of use to all engaged in horticulture. In this enlarged edition will be found instructions for propagation by seed division, layering, cuttings, budding and grafting. The latest methods of using polythene for air-layering, and the application of mist technique for rooting cuttings, are here described. The book includes an alphabetical list of trees, shrubs and other plants with methods of propagation for each, is well illustrated with line drawings and photographs, and is provided with a useful index.

H. S. MARSHALL.

* Simple Propagation. By Noël J. Prockter. Pp. 152. Illus. London: W. H. & L. Collingridge Ltd., Florida: Transatlantic Arts Inc. Price 10/6d.

Library of Medicinal Plants.*—This is a catalogue of publications written on Phytotherapy from 1700 onwards which have been assembled at the home of the compiler at 'Pentlands', Middle Hill, Englefield Green, Surrey. Here the books are arranged alphabetically under authors and cross-referenced under countries. In five years Dr. Henry G. de Laszlo has collected over 1,500 books and pamphlets. The collection is available for consultation by appointment, by anyone working at a recognised scientific institution. This catalogue will be of interest to therapeutic chemists and it is hoped that they will find the collection of assistance to them in their studies.

H. S. MARSHALL.

* Library of Medicinal Plants. Collected by Henry G. de Laszlo, M.A., Ph.D. Pp. [56]. Cambridge: W. Heffer & Sons, Ltd. 1958. Price 10/6d.

Contributions to the Flora of Tropical America : LXV*

Studies in Bignoniaceae, XXIV†

N. Y. SANDWICH

The notes in this paper, in alphabetical order of genera and species, deal mainly with interpretations and reductions, as the result of my examination of numerous authentic specimens borrowed from many herbaria, particularly from those of Paris (P), Vienna (W), Munich (M), Göttingen (GOET), Copenhagen (C), Stockholm (S), Lund (LD), New York (NY) and Ann Arbor (MICH). Very valuable consignments have also been sent for study by the United States National Herbarium (US), the Instituto Agrônômico do Norte at Belém, Pará (IAN), the Instituto Nacional de Pesquisas da Amazônia at Manáus (INPA) and the Instituto de Pesquisas Agrônômicas at Recife, Pernambuco (IPA), as well as by other correspondents. I wish to thank the authorities of all the above-mentioned institutions for their generous help, and in particular Prof. H. Merxmüller (Munich) and Dr. K. H. Rechinger (Vienna) for lending unique holotypes of which no duplicates are known to exist. Once again, the photographs prepared at the Chicago Natural History Museum have been of great assistance.

Anemopaegma foetidum Bur. et K. Schum. in Mart. Fl. Bras. 8, pars 2, 143 (1896).

A specimen in the Göttingen University Herbarium labelled Manáos, 20.iv.1882, ex *Herb. Schwacke* no. III. 258, has been given this name, in Schumann's handwriting, and is presumably a duplicate of the destroyed Berlin holotype (*Schwacke* 3620 (III. 258), fl. April 20th 1882, Manáos) of which I have seen a photograph (Chicago Negative No. 18454). If it is a duplicate, it represents a young branchlet, more slender than that of the type, and the material differs in several other respects from the description in the Flora Brasiliensis. Thus both the branchlet itself, and especially the petioles and petiolules, are very distinctly and copiously puberulous-pilosulous; the leaves are merely bifoliolate with distinct lateral petiolules 2-4 mm. long (no terminal tendril is visible); the somewhat coriaceous, elliptic-lanceolate leaflets are distinctly acuminate at the apex, rounded and even very slightly cordate at the base. Noteworthy features of the corolla are the copiously glandular-lepidote outer side of the tube, the longitudinal series of larger plate-shaped glands on the outer side of the lobes and descending the upper part of the tube, and the relatively small limb. The last two characters are well shown also on the corollas of the Chicago phototype. I can detect no smell on the dried corollas of the Göttingen material which has short, lateral, patulous inflorescences with all the pedicels and flowers fallen.

*† Continued from page 426.

The relationship of *A. foetidum* seems to be with *A. umbellatum* A. Sampaio and *A. maguirei* Sandw., which it approaches very closely in general characters of the leaves and flowers. The Schwacke material at Göttingen suggests the climbing habit of a liana. The distinctions between Schumann's main Sections *Climacopaegma* and *Osmopaegma* are, however, probably unreal. Thus, the type collection of *A. umbellatum* was noted as 'frutex scandens', but a recent collection from Manáus (INPA no. 987), which agrees very well with it, is quite obviously a small shrublet, not climbing. The white flowers of the last-named material, incidentally, are noted as with 'aroma desagradável'. Meanwhile, four other collections from Manáus, INPA 1248, 2917, 3505 and 3764, seem certainly referable to *A. foetidum* and are climbers, 1248 and 3764 having long tendrils trifid and bifid, respectively, at the apex. No. 2917 bears a mature capsule which is elliptic-oblong, acuminate, glabrous but copiously and minutely lepidote, 11 cm. long, 4.7 cm. broad; seeds pale brown with broad, membranous, white (not hyaline) wings, up to about 2.2 cm. long and 3 cm. broad.

Probably, in this instance as in others of this family, the same species can assume both kinds of habit, according to habitat, and *A. umbellatum* may be no more than a variant of *A. foetidum* with strikingly narrow leaflets the lateral ones being sessile, while *A. maguirei* may be another variant with larger calyces and broader corollas.

Anemopaegma leptosiphon Rusby in Mem. N.Y. Bot. Gard. **7**, 354 (1927).

The holotype specimen, *Mulford Biological Exploration* no. 1926, leg. Cárdenas (NY), from Ixiamas, Bolivia, is **Martinella obovata** (H.B.K.) Bur. et K. Schum., a species already known from Bolivia (see Steinbach 6748, 7512; Krukoff 10323). Rusby's name accordingly becomes a synonym.

Arrabidaea macrocarpa Kze. Rev. Gen. **3**, 2, 242 (1898).

The holotype specimen, leg. Otto Kuntze (NY) in vii. 1892, from prov. Velasco, 200 m., Bolivia, is immediately identified with **Arrabidaea rubrinervis** Miers, which is the correct name for *A. subfastigiata* Bur. ex Bur. et K. Schum., see Kew Bull. **1953**, 460-461 (1954). Kuntze's name accordingly becomes a synonym.

Another Bolivian collection of *A. rubrinervis* is *Mulford Biological Exploration* no. 2028, leg. Cárdenas (K), from Tumapusa, at 800 ft. The species has also been collected in Peru at Vitoc, by McLean (K), and at Monterico, by Pearce (K). Its headquarters are in southern Brazil, in the provinces of Minas Gerais and São Paulo.

Arrabidaea orbignyana DC. Prodr. **9**, 184 (1845).

I have examined a specimen of *d'Orbigny* 1135, from Bolivia, in the Paris Herbarium, which has been labelled as this species in Bureau's handwriting and is presumably an isotype (I have also examined the Chicago photograph of the holotype, Neg. No. 39955), and find that it agrees with Steinbach 6236, also from Bolivia and near the type locality, Buena Vista, Dept. Santa Cruz.

The characters are those of *A. pachycalyx* Sprague, and the indumentum of the leaflets comes within the range of that presented by this species and can be matched with that of *Lehmann* 2748, from Colombia. *A. orbignyana* antedates *A. pachycalyx*. It is possible, however, that this taxon is not more than a geographic form or sub-species of *A. candicans* (Rich.) DC., of Venezuela, Guiana and Amazonian Brazil, which differs, as Johnston pointed out in *Sargentia* 8, 269 (1949), in the leaflets being glabrous (not granular-puberulent) above and in the extremely fine and often nearly white coating of their lower surface, the main veins being usually uncoated and glabrous.

***Arrabidaea platyphylla* DC.** Prodr. 9, 186 (1845), non *A. platyphylla* (Cham.) Bur. et K. Schum. in Mart. Fl. Bras. 8, pars 2, 38 (1896) = *A. brachypoda* (DC.) Bur. in Kjoeb. Vidensk. Meddel. for 1893, 98 (1894).

Arrabidaea macrophylla K. Schum. in Engl. et Prantl, Pflanzenfam. 4, 3B, 213 (1894); Bur. et K. Schum. l.c. 25, t. 71.

Arrabidaea elliptica Bur. et K. Schum. l.c. 26.

Arrabidaea bangii Sprague in Bull. Herb. Boiss. sér. 2, 6, 371 (1906).

Arrabidaea syringothyrsus Kränzl. in Fedde Rep. Spp. Nov. 17, 21 (1921).

I have examined three sheets of the type collection of *Arrabidaea syringothyrsus* Kränzl, viz. *Malme* (in Regnell Exped.) 1360, from Cuyabá, Matto Grosso, Brazil, in the Lund Herbarium and can see no reason why Schumann was not perfectly correct in referring it (Mart. Fl. Bras. l.c. 405) to his *A. macrophylla*, the correct name for which is *A. platyphylla* DC., which long antedates the combination *A. platyphylla* (Cham.) Bur. et K. Schum. used for a very different well-known plant which must now be named *A. brachypoda* (DC.) Bur. If Kränzlin had had any understanding of the morphology and variability of species of *Bignoniaceae*, indeed, if he had had any 'eye' at all for these plants, he could not possibly have expressed his surprise at Schumann's determination of the Berlin material of *Malme* 1360. *A. platyphylla*, in fact, shows simple and compound leaves on the same collections: it is evident from the specimens of *Malme*, and from Burchell's and Seibert's field-notes, that it climbs by tendrils whenever it can, producing 2-3-foliate as well as simple leaves.

Recently I have seen three collections of *A. platyphylla* from Peru, viz. *R. J. Seibert* 1989, 2020 and 2153 (all US), all from Iberia, vicinity of Rio Tahuamanu, in the eastern Dept. of Madre de Dios, in the Amazonian drainage system; and three collections from Bolivia, viz. *Rusby* 1153 (K), with very immature fruits, from 'Guanai' (? Huanay, Dept. La Paz), 2000 ft., May 1886 (this collection was listed as *Arrabidaea obovata* DC. by *Rusby* in Bull. Torrey Bot. Club, 27, 69, ann. 1900), *R. S. Williams* 474 (K) from Tumupasa, Dept. La Paz, fl. pink, Dec. 1901 (also distributed as *Arrabidaea obovata* DC.), and *Bang* 2534 (K), the type of *Arrabidaea bangii* Sprague, which I cannot distinguish from *A. platyphylla* except as a form with the leaflets densely lepidote beneath but without hairs (it was again listed as *A. obovata* DC. by *Rusby* in Bull. N.Y. Bot. Gard. 4, 428, ann. 1907).

Arrabidaea elliptica Bur. et K. Schum., to which Sprague allied his *A. bangii*, is doubtless, from the evidence of the photograph (Chicago Negative No. 32856) of the holotype, leg. *Tamberlik* (W), only another form of *A. platyphylla* with acuminate leaflets.

The fruit of this species can now be more fully described from the material of Seibert 2020 and 2153 from Peru, and Burchell 7243 (K) from Goyaz: *capsule* linear-oblong, compressed, attenuate-acuminate at both ends, 8–16 cm. long, 0.9–1.3 cm. broad, the valves densely lepidote and copiously sprinkled with scurfy forked hairs, their margins thickened, their midrib extremely thin and finely prominulous or often scarcely evident; *seeds* transversely oblong, 8 mm. long, up to 3.5 cm. broad, the body dark greyish-brown, the broad wings membranous and whitish-hyaline.

Bignonia benensis Britton ex Rusby in Bull. Torrey Bot. Club, 27, 70 (1900).

The holotype specimen, Rusby 1143 (NY), from the junction of the Beni and Madre de Dios Rivers, Bolivia, is **Pachyptera kerere** (Aubl. emend. Splitg.) Sandw., and *B. benensis* falls into synonymy. This is the first specimen of *P. kerere* which I have seen from Bolivia, but it is known from adjacent Matto Grosso in Brazil (Krukoff 1517). A duplicate of Rusby 1143 is in the Herbarium of the University of Michigan.

Bignonia boliviana Rusby in Bull. Torrey Bot. Club, 27, 70 (1900).

I have examined two isotypes (K, MICH) of Rusby 1142, from the junction of the Beni and Madre de Dios Rivers, Bolivia, August 1886, and should refer them to **Arrabidaea corallina** (Jacq.) Sandw. in Kew Bull. 1953, 460 (1954).

Bignonia brevipes Rusby in Bull. Torrey Bot. Club, 27, 72 (1900).

The holotype specimen, Rusby 1144 (NY), from the junction of the Beni and Madre de Dios Rivers, Bolivia, is **Stizophyllum riparium** (H.B.K.) Sandw. in the broad sense, agreeing with the form known as *S. flos-ardeae* (Pittier) Sandw. Dr. N. L. Britton had written '*Bignonia perforata* Cham.' on the label, showing that he recognized the affinity of the plant (*B. perforata* is *Stizophyllum perforatum* (Cham.) Miers, which itself is a form or variety of *S. riparium* in the broad sense). Rusby's name now becomes a synonym.

This is the first specimen of the genus *Stizophyllum* which I have seen from Bolivia. Another specimen, bearing leaves, fruit and seeds and belonging to the same species, is Rusby 1148 (MICH), from Guanai, Bolivia, 2000 ft., May 1886. Klug 4115 and 4274, from Amazonian Peru, represent the same form of *S. riparium*.

Rusby 1144 was evidently a mixed gathering or, at least, the same number was at first given to two different gatherings and that of one of them was later altered by Rusby. A sheet of *Clytostoma binatum* (Thunb.) Sandw. in MICH has the number 1786 substituted on the label for the original number 1144, which has been crossed through. A former Berlin specimen of no. 1144 was the holotype of *Petastoma laurifolium* Kränzl. in Fedde Rep. Spp. Nov. 17, 57 (1921). Isotypes of this gathering, agreeing with Kränzl's description, are at K and MICH and the material is to be referred, in my opinion, to *Clytostoma binatum*. Similarly, *Petastoma multiglandulosum* Kränzl. l.c. 58, based on Rusby 1145 (isotypes, K, MICH), is also to be referred to *C. binatum*.

Bignonia columbiana Morong apud Morong et Britton in Ann. N.Y. Acad. Sci. 7, 186 (1893).

The fruiting type material without flowers, *Morong* 1535 (NY), from the Pilcomayo River, Paraguay, is immediately identified with **Arrabidaea corallina** (Jacq.) Sandw. in Kew Bull. 1953, 460 (1954), a widely distributed species to which I now reduce *A. rhodantha* Bur. et K. Schum. in Mart. Fl. Bras. 8, pars 2, 44 (1896), the familiar name of a plant very common in Paraguay and N.E. Argentina. Attempts by Sprague and Hassler to sort material of *A. rhodantha* into varieties by characters either of indumentum or shape of leaflets have not, I think, given results of taxonomic value. Morong's material would be *A. rhodantha* var. *elliptica* Sprague forma *glabrescens* Sprague in Bull. Herb. Boiss. sér. 2, 5, 80 (1905), or *A. rhodantha* var. *genuina* Hassl. in Fedde Rep. Spp. Nov. 9, 50 (1910).

The reduction of *A. rhodantha* to *A. corallina* is timely, as it obviates the necessity of making a new combination with the epithet *columbiana*, which has priority over *rhodantha*.

Bignonia eximia Morong apud Morong et Britton in Ann. N.Y. Acad. Sci. 7, 187 (1893).

The holotype specimen, *Morong* 595 (NY), from Central Paraguay, is an obvious *Clytostoma*. No fruit is present. On account of the relatively long petioles and petiolules and, especially, the short calyx with very short subulate teeth, I should refer it to **Clytostoma binatum** (Thunb.) Sandw. Morong's name therefore becomes a synonym.

Bignonia morongii Britton apud Morong et Britton in Ann. N.Y. Acad. Sci. 7, 185 (1893).

I have seen the two syntype specimens, *Morong* 276 and 868 (NY), from Trinidad and the Pilcomayo River, Paraguay and, as might be gathered from the description, the material is the well-known small tree of this region, **Tabebuia nodosa** (Griseb.) Griseb. It seems almost incredible that Dr. Britton could not refer the specimens to even approximately their correct genus, especially as he quoted the field-notes describing the plant as a small tree with a bright yellow corolla. Of these two collections no. 276 has the smaller corollas and could be referred to the var. *parviflora* Griseb. which has, I suspect, no taxonomic validity since, on Hassler 7281 (K), large and small corollas can be seen on different short shoots of the same branch.

Bignonia rusbyi Britton ex Rusby in Bull. Torrey Bot. Club. 27, 71 (1900).

The holotype specimen, *Rusby* 1140 (NY), from the junction of the Beni and Madre de Dios Rivers, Bolivia, is a form of the variable species **Distictella racemosa** (Bur. et K. Schum.) Urb., and *B. rusbyi* thus becomes a synonym of this, since the name was published 4 years later than the basionym *Distictis racemosa* Bur. et K. Schum. A duplicate of *Rusby* 1140 is in the Herbarium of the University of Michigan.

Rusby's material comes well within the range of variation of *Distictella racemosa*, agreeing well with such specimens as *Schultes and Cabrera* 13215 and 17892, and *Black and Ledoux* 50-10707. It also agrees fairly well with *Spruce* 1721, which, as Rusby noted, Dr. Britton had regarded as conspecific, but the

leaflets of Spruce's material are more oblong and broadly rounded at the base and their lateral nerves are more spreading and make a wider angle with the midrib. Nevertheless, I do not think that *Spruce* 1721 represents more than just one other slight variation of *D. racemosa*.

Rusby 1140 is the first Bolivian collection of *D. racemosa* to be seen by me.

***Bignonia tenuiflora* DC.** Prodr. 9, 166 (1845).

Gelseminum amoenum Kze. Rev. Gen. 3, 2, 245 (1898), vars. α *tomentosum* and β *pubescens*.

Tecoma amoena Kze. l.c. 244, nomen.

I have compared Otto Kuntze's type material of *Gelseminum amoenum* in the New York Herbarium with the Chicago phototype (Neg. No. 39936) of *d'Orbigny* 481, the holotype specimen of *Bignonia tenuiflora* in the Paris Herbarium, and also with notes taken by myself when examining that type at Paris and De Candolle's isotype fragments at Geneva in January, 1937. There can be no doubt that the material of the two species is conspecific. Kuntze's locality, the Sierra de Santa Cruz, is quite close to *d'Orbigny's*, in the 'Province de Misque', as noted on his label at Paris. De Candolle's material agrees with the typical form of Kuntze's species, i.e. with his var. α *tomentosum*, with leaflets greyish or whitish-woolly beneath and finely but quite densely pubescent above. Kuntze has written no varietal names on the three sheets bearing his material of *G. amoenum*. A single specimen on one of the sheets must, I think, be his var. β *pubescens*: on this specimen the concolorous leaflets are glabrescent above (very minutely setulose-pubescent, here and there, under a strong lens) and copiously pilosulous with scattered hairs (in no sense woolly or tomentose) beneath, while the inflorescence and calyx are nearly glabrous. This specimen is interesting because it matches other material both from the same region of Bolivia (Vila Vila, *W. M. A. Brooke* 5853; El Puente, Samaipata, *Cárdenas* 5231, in L) and from N.W. Argentina (Jujuy, Puesto Viejo, *Castellanos* 20183 (K) and Huaranghuay del Cerro, ann. 1913, *Schnel* 193 (W); Salta, Rio Caldero, *E. K. Balls* 5944A) which I had referred to *T. garrocha* Hieron., as forms induced by habitat.

Seemann (Journ. Bot. 1863, p. 20) reduced *Bignonia tenuiflora* DC. to *Tecomaria rosifolia* (H.B.K.) Seem., i.e. *Tecoma rosifolia* H.B.K., with which he united *Tecoma azaleiflora* H.B.K., after examining the type material of both species collected by Humboldt and Bonpland. Kew material from Ecuador and Northern Peru which has been referred to *T. rosifolia* suggests that this is a very variable species, especially in the indumentum, and there is one mixed gathering, *Univ. of California 2nd Exped. to the Andes* no. 10096 (K), which comprises specimens with leaflets both grey-tomentose and nearly glabrous beneath. I suspect that *Bignonia tenuiflora* and *Gelseminum amoenum*, also (from the description) *Stenolobium huancabambae* Kränzl., should be reduced to *Tecoma rosifolia*, while the conception of that species may also have to be extended to include *T. garrocha* Hieron., *T. cochabambensis* (Herzog) Sandw., and perhaps others. The *Bridges* specimen (K) from Bolivia, which I have referred to *T. cochabambensis*, was placed by Seemann under *Tecomaria rosifolia*.

Cuspidaria hibiscifolia (Cham.) Bur. ex K. Schum. in Engl. et Prantl. Pflanzensfam., **4**, **3B**, 216 (1894); Bur. et K. Schum. in Mart. Fl. Bras. **8**, pars 2, 158 (1896).

Bignonia hibiscifolia Cham. in Linnaea, **7**, 705 (1832); DC. Prodr. **9**, 159 (1845).

Piriadacus hibiscifolius (Cham.) Pichon in Bull. Soc. Bot. France, **92**, 226 (1945).

I have seen no authentic (Sellow) material of this species. A specimen collected by Schüch (W) is labelled *Cuspidaria hibiscifolia* Bur. in Schumann's handwriting and was photographed for Chicago by Mr. Macbride (Neg. No. 32861). This specimen, which I have studied, does not agree with the original description of Chamisso nor with that of Schumann in the Flora Brasiliensis. I can refer it without doubt to *Mansoa difficilis* (Cham.) Bur. et K. Schum., of which it has all characteristics, including the absence of gland-fields at the nodes, the trifid tendril, and the corolla tube glabrous without while the limb is pubescent. Pichon placed *C. hibiscifolia* in his new genus *Piriadacus*, of which the type is *P. erubescens* (Mart. ex DC.) Pichon. Urban, in Ber. Deutsch. Bot. Ges. **34**, 741-2 (1916), had already rejected *C. hibiscifolia* from *Cuspidaria*, because the anther thecae were straight and glabrous, while the free pollen-grains were trisulcate, punctate or granular, as in *C. erubescens*. Urban did not suggest a new position for either of these species and, without seeing authentic material, I cannot be certain that Pichon was correct in placing *C. hibiscifolia* in *Piriadacus*, beside *P. erubescens*.

Cuspidaria multiflora DC. Prodr. **9**, 179 (1845); Bur. et K. Schum. in Mart. Fl. Bras. **8**, pars 2, 156 (1896); Urb. in Ber. Deutsch. Bot. Ges. **34**, 741-2 (1916).

The only collection is that of *Martius* in Bahia, and there are 2 sheets in the Munich Herbarium, the type specimen (written up by De Candolle), and a duplicate sheet which was photographed (Neg. No. 20460) by Mr. Macbride for the Chicago Natural History Museum. Schumann described the ovules as 26-28 in each loculus and not very regularly (*haud valde regulariter*) biseriate. Urban rejected the species from *Cuspidaria* on account of the simple, unfurrowed, reticulate pollen-grains.

Noteworthy features of the type collection at Munich, not mentioned by Schumann, are the gland-fields at the nodes of the branchlets; the dark, blackish colour of the upper surface of the dried leaflets; and the distinctive calyx teeth which are unequal and range in length from somewhat less than 1 mm. to at least 1.75 mm.

Unfortunately, as so often with these important old specimens of *Bignoniaceae*, corollas are no longer available for dissection and examination of the pollen. This being so, and in the absence of fruit, it seems inadvisable to suggest transference of *C. multiflora* to any genus. *Arrabidaea*, *sensu lato*, is obviously indicated by many characters, as was realised by Schumann, and one could suggest affinity with *A. puberula* (Mart. ex DC.) Bur. or *A. pulchella* (Cham.) Bur. Of these, however, the former was referred by Pichon to his genus *Blepharitheca*, with pollen-grains in tetrads, and the latter to his *Paracarphaea*, with 3-furrowed pollen-grains; while Urban found trisulcate

pollen-grains in at least 12 species of *Arrabidaea*. The epithet *multiflora* is pre-occupied in *Arrabidaea* by *A. multiflora* Bur. et K. Schum.

Jacaranda glabra (DC.) Bur. et K. Schum. in Mart. Fl. Bras. 8, pars 2, 394 (1897).

Pteropodium glabrum DC. Prodr. 9, 239 (1845).

A photograph of the Paris Herbarium holotype, *d'Orbigny* 1133, from between Buena Vista and San Carlos, Bolivia (not 'Brazil'), was taken for the Chicago Natural History Museum (Neg. No. 39968), and a print is now in the Kew Herbarium. The field-label bears the following valuable information: 'Arbolito delgado cuyo diametro es de una pulgada, muy derecho, sus flores moradas negruscas, que salen en el tronco solamente, y sus hojas forman en su estremidad superior una copa a manera de paraguas; el reside sobre las lomas del camino de San Carlos a Buenavista en montes. No. 1133. Octubre' (spelling here and there adapted for modern Spanish).

The winged rhachis of the pinnae of the leaves, the shape of the leaflets, and the characters of the inflorescence rising from the old wood and the dark purple corollas, immediately identify this species with the two following, which are clearly conspecific and occur in the same region of Bolivia and adjacent Brazil: **Jacaranda longiflora** Britton ex Rusby in Bull. Torrey Bot. Club, 27, 73 (1900), based on Rusby 1151 (NY!); and **Jacaranda atropurpurea** Rusby in Mem. N.Y. Bot. Gard. 7, 357 (1927), based on White 862 (*sic*: the isotype at Kew is numbered 872).

Three other species, of Amazonian Peru, with the same habit, and likely to prove conspecific with *J. glabra* when variability within this species of such characters as indumentum and winged or wingless leaf-rhachis is proved by ample material, are *J. cauliflora* Bur. et K. Schum., *J. rachidoptera* Bur. et K. Schum., and *J. intermedia* Huber (1900) *non* Sonder (1849). Huber himself remarked that his species was intermediate between *J. cauliflora* and *J. rachidoptera*, and suggested that all three might eventually be united as a single species, *J. cauliflora*. If all six are united, as I suspect they will be, the name to be used will be *J. glabra*.

Macfadyena bangii Rusby in Bull. Torrey Bot. Club, 27, 72 (1900).

The holotype specimen, Rusby 1139 (NY), from the junction of the Beni and Madre de Dios Rivers, Bolivia, is **Phryganocydia corymbosa** (Vent.) Bur. ex K. Schum., and Rusby's name falls into synonymy. The rest of the New York material of this number, referred to by Rusby as belonging to a distinct species, is mounted on the same sheet as the type and merely represents an apical branchlet of *P. corymbosa* with reduced very young and thin leaflets and smaller corollas. It may well have come from the same plant as the type. Rusby's description of the corollas as 'yellow' (a colour impossible for *P. corymbosa*, although white-flowered forms are known) must have been due to some misunderstanding or error and has doubtless misled botanists who have not examined the type specimen. Probably Rusby, knowing that the colour of the corolla of *Macfadyena* in its restricted modern sense is yellow, was gratuitously supplying information lacking in his field-notes. In fairness to Dr. N. L. Britton, it must be stated that he wrote the identification

'*Macfadyena corymbosa* (Vent.) Griseb.' on the label. This has been crossed through in pencil, presumably by Rusby. A duplicate of *Rusby* 1139 is in the Herbarium of the University of Michigan.

This is the first collection of *P. corymbosa* which I have seen from Bolivia. This species occurs in adjacent Matto Grosso.

Macfadyena violacea *Rusby* in Mem. N.Y. Bot. Gard. 7, 356 (1927).

The very inadequate holotype specimen, *Rusby* 774 (NY), from Rurrenabaque, Bolivia, is ***Clytostoma uleanum* Kränzl.** in Notizbl. Bot. Gart. Berlin, 6, 374 (1915) and see Sandwith in Kew Bull. 1954, 605 (1955). *Rusby*'s name accordingly becomes a synonym. This is the first collection of *C. uleanum* which I have seen from Bolivia.

Memora adenophora *Sandwith*, sp.nov.; Sect. *Pharseophorae* K. Schum., *M. longilineae* A. Sampaio affinis, nervis secundariis foliolorum subtus multo magis prominentibus atque reticulatis, calyce spathaceo-fisso vel breviter bilobo bracteolas vulgo superante, praesertim indumento insigni pilorum hyalinorum papilliformium apice glandulas aurantiaco-brunneas gerentium secus ramulos folia inflorescentias plus minusve dense dispositorum differt.

Frutex ope cirrhorum verosimiliter simplicium scandens; ramuli robusti, vetustiores ad 7 mm. diametro, teretes, pilis papilliformibus hyalinis rigidis inaequalibus patentibus apice glanduliferis (glandulis aurantiaco-brunneis) necnon aliis multo brevioribus gracilibus eglandulosis immixtis dense induti; pseudostipulae foliaceae, late ovatae vel suborbiculares vel reniformes, ad 1 cm. longae et 1.3 cm. latae, saepe minores atque deciduae. *Folia* ternatim 2-3-imparipinnata, petiolo 1-4.5 cm. longo; pinnae 2 primariae 3-11-foliolatae, scilicet inferne nonnunquam uno pari pinnularum 3-foliolarum praeditae, 12-35 cm. longae; internodia ad 9 cm. longa, velut petiolus petiolulique indumento ramulorum dense induta pilis gracilibus eglandulosis saepe multo numerosioribus vel senectute glabrata, nodis more generis incrassatis; petioluli 1-2 cm. longi, sub lamina conspicue incrassati; foliola elliptica usque ovata, apice acuminata, basi cuneata usque fere rotundata et lateraliter aliquantum obliqua, 4.5-15 cm. longa, 2-8.8 cm. lata, firme chartacea sed senectute valde coriacea supra sub-bullata marginibus revolutis, siccitate saepe griseo-olivacea, supra costa nervisque primariis puberulis exceptis glabra, subtus indumento duplici e setulis eglandulosis numerosioribus et papillis glanduliferis multo brevioribus composito secus costam nervosque praedita, costa nervis venulis supra planis vel in foliolis coriaceis impressis subtus prominentibus atque laxe reticulatis, nervis primariis utroque costae latere 6-8 sursum arcuatis et longe a margine anastomosantibus. *Inflorescentiae* racemosae, axillares, in quaque axilla saepe binae; racemi saepe arcuati, ascendentes vel penduli, vulgo 10-18 cm. longi, ubique pilis hyalinis papilliformibus inaequalibus apice glandulas gerentibus plus minusve dense induti, satis pauciflori internodiis inferioribus 2-3 cm. longis; bractae primariae infimae parvae lanceolatae concavae vix ad 5 mm. longae et 1 mm. latae, superiores magis foliaceae ellipticae acute acuminatae ad 1 cm. longae et 4 mm. latae, siccitate velut bracteolae calycesque saepius nigrescentes; pedicelli 1-1.8 cm. longi, vel summi

breviores; bracteolae calycem primo plus minusve involventes sed semper breviores, demum patulae, late ovato-ellipticae, acute mucronato-vel cuspidato-acuminatae, 1-1.6 cm. longae, vulgo 7-9 mm. latae, pilis glanduliferis satis copiose indutae ac aliis longioribus eglandulosis sparsis ciliatae. *Calyx* tubuloso-campanulatus, unilateraliter spathaceo-fissus vel bilateraliter breviter bilobus, praeterea costis in denticulos 5 excurrentibus, 1.4-2 cm. longus, extra glabratus vel utrinque praesertim intus glandulis sessilibus obsitus. *Corolla* lutea, infundibuliformi-campanulata, extra glabra, tubo parte basali cylindrica ad 1.2 cm. longa tum ampliata et sub lobis 1.4 cm. lato, intus zona pilorum papilliformium sub insertione staminum praedito; limbus circiter 3 cm. diametro. *Stamina* circiter 1 cm. supra tubi basin inserta, glabra, antica longiora 2.3 cm. lateralia 1.8 cm. longa; antherarum thecae 2.5 mm. longae; staminodium gracile, glabrum, 7.5 mm. longum. *Discus* cupulari-pulvinatus, 1 mm. altus. *Ovarium* lineari-oblongum, 4-5 mm. longum, ad 1.3 mm. latum, dense glandulosum; stylus glaber, 2.8-3 cm. longus stigmatibus inclusis; ovula in quoque loculo pauca 8-9, ut videtur (an semper?) uniseriata. *Capsula* elongato-linearis, compressa, immatura apice basique attenuata, 50 cm. longa, 2 cm. lata, pilis multicellularibus inaequalibus plerisque apice glanduliferis dense induta, costa mediana vix distinguenda; matura fere 80 cm. longa, 2.5 cm. lata, siccitate pallide brunnea, glabrata sed papillis minutis glanduliferis hic illic adhuc obviis, costa prominula. *Semina* magna transverse oblonga, siccitate brunnea, 1.5-2 cm. longa, fere ad 7.5 cm. lata, valde compressa, alis colore corporis sed apice pallidioribus membranaceis.

BRAZIL. Amazonas: Manáus, Br.-17 km. 26, terra firme, mata primaria, fl. June 27th 1956, leg. *Dionisio*, INPA Herb. 3942 (K); *ibid.*, Br.-17 km. 11, terra firme, capoeira fechada alta, fl. April 16th 1956, leg. *Chagas*, INPA 3734 (type in K); *ibid.*, Igarapé do Bindá, terra firme, mata virgem, fl. June 10th 1955, leg. *Luiz*, INPA 1167 (INPA); *ibid.*, Igarapé do Bindá, terra firme, capoeira baixa, fr. immatur., August 17th 1956, leg. *Dionisio and Luiz*, INPA 4104 (K); *ibid.*, along road to Aleixo, in old clearing, fr. matur., Aug.-Sept. 1936, *Krukoff* 7955 (K).

This is a very distinct species of Section *Pharseophora*, on account of the gland-tipped papilliform hairs which are so plentiful on the young branchlets, leaves, inflorescences and capsules; the large old leaflets, which are almost bullate above and reticulate-veined beneath; the bilobed or spathaceously split calyx which exceeds the bracteoles; and the very long mature capsule with very broad seeds. The affinity is evidently with *M. longilinea* A. Sampaio, the type locality of which is also near Manáus. In two ovaries I dissected I could find only a single row of ovules in each loculus, with 8-9 ovules in the row.

Petastoma discocalyx Bur. et K. Schum. in Mart. Fl. Bras. 8, pars 2, 80 (1896) is **P. cuneifolium** (DC.) Bur. et K. Schum., l.c. 77, and becomes a synonym.

I have compared two Kew sheets of the type collection (*Glaziov* 14111, from Serra d'Ouro Preto, Minas Gerais) of *P. discocalyx* with the three authentic sheets of *Bignonia cuneifolia* DC. in the Munich Herbarium, and I fail to find any differences in the leaflets, calyx or corolla. *P. cuneifolium* has,

in fact, the outstanding character of *P. discocalyx*, viz. the tomentum of the outer side of the corolla, which extends from the lobes down the tube nearly as far as the widely spreading, conspicuous calyx.

The Munich sheets are in very poor condition, but the obvious desirable lectotype would be the material labelled as growing 'in silvis camporum ad margines, in sepibus provinciae Piahiensis [sphalm. Piauhiensis], Dr. Martius, Iter Brasil., Maio'. Martius has himself written on the label 'Bato-cydia cuneifolia Martii', another hand has added 'Bignonia cuneifolia DC.', and Bureau has written 'Petastoma cuneifolium'. This sheet was photographed, as Neg. No. 20446, for the Chicago Natural History Museum. Unfortunately, the Piahy sheet was not mentioned by De Candolle in his description, where he cited the Martius material from Bahia and Minas Gerais. Of the 2 sheets at Munich showing this material, the Minas Gerais (Serro Frio) one is ruled out since the material consists solely of fragmentary flowers and 3 small, detached leaflets, all in an envelope. It might therefore be insisted that the specimen labelled 'in sylvis Catingas provinciae Bahiensis' must be taken as the lectotype. There are good leaves on this specimen, and also a single flower in advanced bud stage, showing the characteristic tomentum. The labels on this sheet bear the determinations of Martius and Schumann, and the specimen agrees perfectly with the Piahy material. No handwriting of De Candolle himself is found on any of the three sheets.

Petastoma pentstemonoides (Kränzl.) Sandwith, comb. nov.

Arrabidaea pentstemonoides Kränzl. in Notizbl. Bot. Gart. Berlin, **6**, 370 (1915).

BOLIVIA. Rio Acre: in forests near Cobija, fl. violet, Jan. 1912, *Ule* 9780 (isotype, K).

PERU. Madre de Dios: region of Iberia-Iñapari, fls. purple, June 1945, *R. E. Schultes* 6474 (US).

Dr. Schultes's specimen agrees very well with the isotype specimen and was collected some 60–70 miles S.W. of the type locality. This taxon, with large and glabrous calyx, is closely related to *P. leucopogon* (Cham.) Bur. of Brazil and *P. broadwayi* Sprague et Riley of Trinidad, differing from the former in the absence of the characteristic dense indumentum, and from the latter in the smaller flowers and more pointed calyx teeth.

The following notes were taken from a flower of *Schultes* 6474: calyx ellipsoid-campanulate, glabrous, membranous, in all 1.1 cm. long, 7 mm. wide, the lobes broadly deltoid-triangular and acute in outline, 1–1.3 mm. long; corolla scarcely up to 3 cm. long, the expanded limb about 2 cm. in diameter, the basal cylindric portion of the tube 7 mm. long, the upper portion of the tube 1.5 cm. long and glabrous outside, the lobes less than 1 cm. long; stamen pairs 1.05 and 1.25 cm. long, the anther thecae curved-divergent and 2 mm. long; staminode 4.5 mm. long; disk pulvinate, 1 mm. high; ovary cylindric-oblong, 2.3 mm. long, lepidote, ovules about 20 in each series.

Pleonotoma brittonii (as *Brittoni*) Rusby in Bull. Torrey Bot. Club, **27**, 72 (1900).

The holotype specimen, *Rusby* 1150 (NY), from the Falls of the Rio Madeira, Brazil, is in my opinion conspecific with ***P. auriculata*** K. Schum. ex *Sprague* in *Verhandl. Bot. Ver. Brandenburg*, **50**, 122 (1909). The latter name therefore becomes a synonym of *P. brittonii*.

The following specimens (all at K) seem to be referable to this species: *Klug* 2996 and 3778, from Amazonian Peru, distributed as *P. Uleanum* Kränz., det. Standley; *Krukoff* 10562, from Bolivia (Dept. La Paz), distributed as *P. jasminifolia* (H.B.K.) Miers, det. Seibert. The last-named collection bears a capsule with valves 35 cm. long and just over 2.5 cm. broad.

Herb. Mus. Nac. Rio de Janeiro Cat. geral no. 19883, from Brazil (Obidos, Pará, 9.ix.1928) also belongs here, I think, as a form with a reduced inflorescence and short calyces only 6 mm. long.

Pleonotoma castelnaei (Bur.) *Sandwith*, stat. nov. et sp. nov.

Pleonotoma variabilis (Jacq.) Miers var. *castelnaei* Bur. in Kjoeb. Vidensk. Meddel. for **1893**, p. 105 (1894); K. Schum. in *Mart. Fl. Bras.* **8**, pars 2, 277 (1897), obs.

Frutex scandens, fere glaber, prope nodos ramulorum foliorumque minute pubescens. *Pseudostipulae* foliaceae, petiolatae, orbiculari-reniformes, apice breviter cuspidatulae, basi leviter cordatae, ad 1 cm. longae atque tum paulo latiores. *Folia* bi- vel tri-pinnata, in exemplo unico viso apicem ramuli versus satis brevia ad 12 cm. longa foliolis congestis, cirrho nullo viso, petiolo 2-2.5 cm. longo; foliola mediocria vel satis parva, ovata vel ovato-lanceolata, apice conspicue acuminata, basi obtusa vel rotundata atque nonnunquam leviter cordata, 1.5-4.5 cm. longa, 1-2.2 cm. lata, firme chartacea, nitida, glabra nisi secus costam nervosque primarios paginae superioris minutissime puberula, venulis utrinque conspicue laxe reticulatis. *Inflorescentia* unica visa videtur terminalis, brevissima; pedicelli flexuosi, glabri, circiter 1.5 cm. longi. *Calyx* tubuloso-campanulatus, 8.5 cm. longus, 4.5 cm. latus, ore truncato minute denticulato necnon ciliolato, ceterum glaber sed sparse lepidotus, siccitate rugosulus. *Corolla* fere hypocrateriformis, angustissima, tubo curvato 4 cm. longo basin versus 1.75 mm. lato sursum sensim ampliato sed apice circiter 6 mm. tantum lato, extra glabro; limbus circiter 2 cm. tantum diametro, lobis parvis utrinque pubescentibus atque glanduloso-lepidotis. *Stamina* antheris conspicue e fauce corollae exsertis, thecis divergentibus 3 mm. longis. *Fructus* deest.

BRAZIL. Without locality, *Glaziou* 9952 (type or isotype in E. Warming Herb., C; the specimen at Paris, see *Glaziou's 'Liste'*, will perhaps be regarded as the type).

This plant cannot possibly be identified with any form of *P. variabilis*, and was almost certainly collected outside the range of distribution of that species, which is at present not known to occur in Brazil. I have been unable to refer it to any described species, and it certainly does not agree with *P. stichadenia* K. Schum., under which Schumann (*loc. cit. supra*) hinted, by implication, that it might be placed. The outstanding characters of *Glaziou's* specimen are the glabrescence, the foliaceous pseudostipules, the numerous (but not very numerous) rather small and shining congested leaflets, the long

calyx and, above all, the more or less hypocrateriform corolla with long and very narrow tube, gradually but not much widened to the apex, and relatively small limb with exserted anthers. These corolla characters indicate, perhaps, relationship with *P. pavettiflora* Sandw. (see below), of Matto Grosso, a species which lacks foliaceous pseudostipules and has much larger and fewer leaflets and extremely small corollas, thus wholly different in facies from Glaziou's specimen.

Pleonotoma imperatoris-maximiliani (Wawra) Bur. et K. Schum. in Mart. Fl. Bras. 8, pars 2, 279 (1897).

Bignonia imperatoris-maximiliani Wawra, Bot. Ergeb. Reise Maximilian Bras. 73, t. 10 (1866).

The holotype material of this species, collected by Wawra and Maly (no. 156) near Itaparicá, Bahia, and now preserved in the Vienna Naturhistorisches Museum Herbarium, was photographed by Mr. Macbride for the Chicago Natural History Museum as Negative No. 32814, and a print is now at Kew. This material was considered so bad and fragmentary by Schumann (loc. cit. 280, obs.) as to be less suitable for description than the excellent coloured plate provided by Wawra. The photograph, showing opposite, simple leaves (no leaflets) and a long flowerless inflorescence suggesting a narrow raceme with many scars in decussate pairs, was so odd and so unlike Wawra's plate, that I felt that I must examine the material more closely, and it was kindly lent to Kew by the authorities at Vienna. This material is indeed odd and deplorably fragmentary, and it has been mounted in such a way as to confuse the superficial observer and perhaps wholly mislead anyone who might examine the photograph alone. It consists of two branchlets terminated by inflorescences from which all the flowers have fallen and a large number of detached leaves (or leaflets). In a large packet on the sheet are many more leaflets, portions of petiole, and a number of calyces, young buds and mutilated corollas which are certainly Bignoniaceous. None of the "leaves" is attached to the nodes of the branchlets. The inflorescence is quite unlike that figured by Wawra, does not resemble that of *Pleonotoma*, and may even belong to some different family. The leaflets, if such they be, not leaves, are also not recognized by me, but they may be those figured by Wawra, and the presence in the packet of two petioles, obviously from compound leaves, suggests that they are.

Two small leaves in the packet are quite distinct from the rest and suggest a species of *Terminalia*, in *Combretaceae*. The calyces have gland-fields outside in the upper half. The corollas are not, I think, those of a *Pleonotoma* since they lack the characteristic pubescence and glandular-lepidote clothing of the limb. They do possess lines of plate-shaped glands on the outside, below the lobes. The terete branchlets, as described by Wawra and evident on the material, are of course wholly distinct from those of *Pleonotoma*. No tendrils are present.

I find it impossible to make a decision about this species since this dreadful material gives no help. My own belief is that the plant figured by Wawra was not a *Pleonotoma* but that it may represent a red-flowered species of *Memora* in Sect. *Memora*, near *M. valida* and *M. flavida*. The leaflets, calyces

and corollas of the dried material would fit into this group, I think, and the terete branchlets of the description support this. Let us hope that further complete collections near Itaparicá will settle the identity and genuine position of this mysterious species.

Pleotoma pavettiflora Sandw. in Kew Bull. 1934, 103.

BRAZIL. Terr. do Guaporé: Porto Velho, 'ilhas de mata e campo misturados, beira da estrada, até Viana, km. 8', flowers cream, May 27th 1952, G. A. Black and E. Cordeiro 52-14545 (IAN; K).

The second collection of this species, which was described from Matto Grosso material.

Schlegelia parviflora (Oerst.) Monachino in Phytologia, 3, 103 (1949).

Dermatocalyx parviflorus Oerst. in Kjoeb. Vidensk. Meddel. ann: 1856, p. 29.

Tabebuia micrantha Kränzl. in Fedde Rep. Spp. Nov. 17, 215 (1921).

Schlegelia ramizii Sandw. in Kew Bull. 1930, 211.

S. ramizii Sandw. var. *macrandra* Sandw. in Kew Bull. 1940, 303.

S. ramizii Sandw. var. *costaricensis* Sandw., loc. cit. 303.

S. ramizii Sandw. var. *trichandra* Sandw., loc. cit. 304.

S. roseiflora Ducke in Tropical Woods, 76, 29 (1943).

S. organensis Kuhlmann. in Rodriguesia, no. 20, 7 (1946); Sandw. in Kew Bull. 1953, 459 (1954).

I have recently examined the type material of *Tabebuia micrantha* Kränzl. (2 sheets in the Stockholm Herbarium, leg. Mosén 3662) and find it indistinguishable from that of my *Schlegelia ramizii*, to which I recently reduced Kuhlmann's *S. organensis*. Ducke's *S. roseiflora* seems to me merely a form with pale rose-coloured corollas of the same taxon, which usually bears white flowers. I believe now that all the above 'species' of the Section *Paratanaecium* are conspecific with *S. parviflora* which should be regarded as a very widely distributed plant, occurring from Central America (British Honduras, Guatemala, Costa Rica), through Colombia and Amazonian Peru to Brazil, where it is found as far south as the State of São Paulo. I should no longer maintain the three varieties which I described in 1940 under *S. ramizii*. Monachino (loc. cit.) suggested that both *S. cornuta* Donn. Sm. and *S. costaricensis* Standl. were probably conspecific with *S. parviflora*. This is certainly not true of the former, a wholly distinct plant of which an isotype is at Kew, and probably not of *S. costaricensis* either, to judge from the description which gives the corolla as nearly 4 cm. long and the calyx as campanulate and 12 mm. long.

Scobinaria japurensis (DC.) Sandwith, comb. nov.

Tabebuia japurensis DC. Prodr. 9, 214 (1845).

Arrabidaea japurensis (DC.) Bur. et K. Schum. in Mart. Fl. Bras. 8, pars 2, 65 (1896).

Dr. R. J. Seibert, in his *Bignoniaceae* of the Maya area (1940), created the genus *Scobinaria* in order to accommodate a single Central American species, *S. verrucosa*, whose leading characteristics were the large tubular-campanulate bilabiate split calyx and the remarkable, long, compressed-linear capsule covered with prickly tubercles. At the same time he indicated the apparent affinity of *Arrabidaea lenticellosa* Bur. et K. Schum., in the Section *Macrocalycinae* of *Arrabidaea*, whose fruit was still unknown.

Recently, in *Caldasia*, **7**, 24-26 (1955), Dr. A. Dugand has added a second, Colombian, species, *S. amethystina* Dugand, and has repeated the suggestion of the probable affinity of some species of the Section *Macrocalycinae* of *Arrabidaea*, particularly *A. lenticellosa* and *A. japurensis*.

It was indeed obvious that *A. japurensis* and its allies were of this affinity, but no collection was available from South America showing leaves, flowers and fruits all together. Now, however, I have been able to examine such a collection, made by Dr. Seibert himself, in the United States National Herbarium. It is *Seibert* 1953, from the Dept. of Madre de Dios, Peru, collected at 330 m., at Iberia, Rio Tahuamanu, on October 18th, 1944. This collection I should certainly refer to *Arrabidaea japurensis* (DC.) Bur. et K. Schum., of which there is a phototype in the Kew Herbarium. The fruit and seeds agree exactly with Dr. Seibert's description of those of *S. verrucosa*. One might add that the prickly capsules dry a blackish colour and that the seeds are pale brown, except for the narrow hyaline margin of the wings, which is a dirty white.

S. japurensis is a very widely ranging species in Amazonia, having been collected in Colombia, Venezuela, Brazil, Peru and Bolivia, and it is likely that *Arrabidaea lenticellosa*, *A. egensis* (as an indumentum form) and perhaps even *A. oligantha* (a Guiana species with white flowers), all species proposed by Bureau and Schumann, are conspecific. My experience with the wide distribution and variability of these climbers leads me to suspect that *S. verrucosa* and *S. amethystina* will also be reduced to *S. japurensis*.

Setilobus vicentinus Kränzl. in Fedde Rep. Spp. Nov. **17**, 122 (1921).

The holotype (in W), collected by *Caley* on the island of St. Vincent, proves on examination to be ***Onohualcoa helicocalyx*** (Kze.) Sandw., and extends the known range of that species northwards from Trinidad. The specimen was photographed for the Chicago Natural History Museum (Negative No. 32876).

Sparattosperma leucanthum (Vell.) K. Schum. in Engler, Pflanzenfam. **4**, **3B**, 235 (1894); apud Bur. et K. Schum. in Mart. Fl. Bras. **8**, pars 2, 360 (1897), in obs.

Bignonia leucantha Vell. Fl. Flum. text, ed. Netto, 251 (1825); Ic., **6**, t. 49 (1835).

Spathodea vernicosa Cham. in Linnaea, **7**, 661 (1832).

Tecoma salzmanni DC. Prodr. **9**, 219 (1845).

Sparattosperma lithontripticum Mart. ex DC., l.c., 203.

S. vernicosum (Cham.) Bur. et K. Schum., l.c., 359, t. 116.

Now that the dates of publication of the text and plates of Velloso's *Flora Fluminensis* have been clearly established (cf. *Flora Malesiana*, ser. 1, vol. 4, pt. 5, p. ccxv), it is evident that, in spite of his remarks in the *Flora Brasiliensis*, we must use Schumann's earlier combination of Velloso's epithet in preference to the now familiar name *S. vernicosum*.

The reduction of *Tecoma salzmanni* to this species, which Schumann thought probable, was made by me in *Candollea*, 7, 252 (1937). *Sparattosperma leucanthum* has recently been re-collected in Bahia by Dr. D. de A. Lima, who has also extended its range into Pernambuco (Lagêdo-Canhotinho, Oct. 1956, in IPA).

Sparattosperma neurocalyx Bur. et K. Schum. in Mart. Fl. Bras. 8, pars 2, 361 (1897).

I have examined a duplicate syntype specimen, *Regnell* Ser. III. 54, leg. in Minas Gerais, Brazil, on Oct. 31st 1864, in the Herbarium of the Botaniska Museet, Lund, which agrees with the description of this species. The material (distributed from Stockholm) is immediately referable to ***Tabebuia roseo-alba*** (Ridley) Sandw., and, like the second Stockholm specimen of *Tecoma schumanni* Kränzl. (see below), has the large calyx and corolla of Toledo's var. *violascens* of *Tabebuia odontodiscus*, which I have reduced to *T. roseo-alba*. The large strongly-ribbed calyx matches well that of *Herb. Jard. Bot. Rio* 75058, from the Jardim Botânico, Rio de Janeiro. Thus we have three different gatherings of different dates of *Regnell* Ser. III. 54, on which *Tecoma schumanni* Kränzl. and *Sparattosperma neurocalyx* Bur. et K. Schum. have been based, which, in the end, can all be placed under *Tabebuia roseo-alba*.

Tabebuia bureavii Sandwith, nom. nov.

Tecoma dentata Bur. et K. Schum. in Mart. Fl. Bras. 8, pars 2, 323 (1897).

The above new name is required for this very distinct species of Corcovado, on transference to *Tabebuia*, owing to the prior existence of *Tabebuia dentata* Miers in *Proc. Roy. Hort. Soc.* 3, 199 (1863). Miers was making an illegitimate name-change for *Spathodea ilicifolia* Seem. in *Bonplandia*, 7, 246 (1859), which he was transferring to the genus *Tabebuia*—unaccountably, since Seemann's plant was a climber and is now known as *Vellosiella dracephaloides* (Vell.) Baill., in *Scrophulariaceae*.

I have seen the following collections of *Tabebuia bureavii*: Corcovado, Rio de Janeiro, *Glaziou* 12081 (dupl. of syntype in P and C); *Glaziou* 12080 (K); Dec. 31st, 1825, *Burchell* 1384 (K). The Kew material of *Glaziou* 8806, a collection cited *ex parte* under *Tecoma dentata* by Schumann, belongs to the completely different species *Tabebuia heptaphylla* (Vell.) Toledo, which is very closely related to *T. avellanadae* Lor. ex Griseb.

As the Berlin syntype specimens of this species have been destroyed, I choose as lectotype the Paris Herbarium material of *Glaziou* 12081. This shows two immature capsules, falcately curved, the largest of which is quite 23 cm. long and up to 1 cm. broad. These capsules, which have dried a blackish colour, are both minutely lepidote and minutely pubescent with branched stellatiform hairs.

Tabebuia micrantha Kränzl. in Fedde Rep. Spp. Nov. **17**, 215 (1921) is **Schlegelia parviflora** (Oerst.) Monachino, vide supra p. 440

Tecoma attractocarpa Bur. et K. Schum. in Mart. Fl. Bras. **8**, pars 2, 326 (1897).

I have examined a duplicate of the holotype collection, *Riedel* 2889, in the Paris Herbarium. The material consists of a leafless branchlet with an inflorescence and good corollas (there are also a number of detached corollas in an envelope) and another branchlet bearing a number of leaves on young shoots at its apex. Both portions agree in the main with Schumann's description in the *Flora Brasiliensis*, but unfortunately the spindle-shaped capsule, from which the specific epithet was derived, is not present. *Riedel*'s field-ticket gives the following notes: 'arbor 12-15 ped. fol. 5-7, foliol. dentat. subt. pubescentib. flor. luteis'. The leaves of the Paris material are nearly all 3-foliolate, only one is 4-foliolate. The lateral leaflets are remarkably unequal-sided at the base and with very short petiolules or sessile, and the veinlets of all the leaflets are prominulous on both surfaces, especially on the lower. The indumentum of short *simple* hairs on all parts of the leaf is very unusual. I cannot match this foliage with that of any species of *Tabebuia* known from Brazil, yet there is no reason to doubt that it belongs to that genus. On the other hand, the branchlet with the inflorescence, and the corollas themselves, can be easily identified with *T. ochracea* (Cham.) Standl., to which the leaves and the capsule (as described by Schumann) could not possibly belong. My belief is that the gathering is a mixture: the inflorescence belongs to *Tabebuia ochracea*, the foliage and fruit to another species, *T. attractocarpa*, which does not appear to have been re-collected. Since the holotype at Berlin has presumably been destroyed, it is desirable to choose the Paris branchlet with foliage, of *Riedel* 2889, as the lectotype of *T. attractocarpa*, especially as phototypes of this have been widely distributed (Chicago Natural History Museum Neg. No. 39963). I do not, however, wish formally to make the new combination in *Tabebuia* until more is known of this mysterious tree.

Tecoma schumanni Kränzl. in Fedde Rep. Spp. Nov. **17**, 223 (1921) is **Tabebuia roseo-alba** (Ridley) Sandw. in Kew Bull. **1954**, 597 (March 1955).

I have examined two sheets of *Regnell* III. 54 in the Stockholm Herbarium, both from Minas Gerais and both marked as 'Typus' by Kränzlin. Although given the same number, the specimens are quite distinct gatherings at different places and dates, as is shown by the labels. The material of one sheet, from Uberava, 18.xi.1848, is the more usual form of *T. roseo-alba* with short calyces, and also bears some rather young leaves but no corollas. The gathering on the other sheet, from Ribeirão dos Bugres, Caldas, 18.x.1860, has leafless branchlets, large (1.5-1.8 cm. long) calyces and large (about 6 cm. long) corollas and may be compared with Toledo's variety *violascens* of *Tabebuia odontodiscus*, a species which I have reduced to *T. roseo-alba*. It was this second sheet which was cited by Kränzlin when he published his description of *Tecoma schumanni* (see also above, under *Sparattosperma neurocalyx*).

Trifolium somalense : a clover with tuberous roots

J. B. GILLETT

Trifolium somalense *Taub.*, Ann. Ist. Bot. Rom. 7: 90 (1898); Fiori, N. Giorn. Bot. It. n.s. 55: 345, fig. 24 (1949); Gillett, Kew Bull. 1952: 373, fig. 2; 8-10 (1952).

Till recently this species was known from the type gathering only. Further material is now available, which enables its descriptions to be corrected and amplified in several important respects.

Perennial herb; stems erect or ascending, each arising from a cluster of 2-5 tapering tuberous roots, whose thickened portion, when dried, may be up to 8 mm. in diameter near the top and 8 cm. long. Pedicels of outer flowers c. 1 mm., of inner flowers up to 3 or 4 mm. long, reflexed after flowering. Calyx nerves frequently over 11 and up to 14 in number through the splitting of some of the commissural nerves. Corolla white. Ovary with a stipe 1.5-2 mm. long, 2-ovulate. Fruit c. 3 mm. long and 1.3 mm. wide, 2-seeded.

SOUTHERN ETHIOPIA. Between Bidduma and Alge (Aghere Mariam) 38-39° E., 5°-6° N., c. 2000 m., Sept. 1893, *Riva* 1301 FI type. Mega mountain, c. 38° 20' E., 4° 4' N., c. 2 km. S.S.E. of British consulate, 1980 m., open little-grazed areas in *Juniperetum* on red sandy soil overlying metamorphic sandstone, locally common, 17.11.1952, *Gillett* 14323.

The community of erect grasses and forbs in which *T. somalense* was found at Mega was quite different from the close sward in which *T. semipilosum* Fres. flourished on the heavily grazed parts of the same mountain; the two species were not seen together. The rainfall at Mega (average of 4 years 515 mm.) is very low for *Trifolium* but there is much additional moisture from low cloud and mist.

The tuberous roots of *T. somalense* are extraordinary in *Trifolium* but recently E. Milne-Redhead and P. Taylor have found similar though smaller roots in the related *T. stolzii* in Southern Tanganyika. Their discovery emphasizes the importance to collectors of a small pick or entrenching tool, the only instrument suitable for exploring subterranean organs under most African conditions.

The fact that the pedicels of *T. somalense* are now known to be lengthened and reflexed after flowering invalidates its position in the Key to Tropical African species of *Trifolium* in Kew Bull. 1952: 369. It must now be placed next to *T. cheranganiense* Gillett, which is clearly its nearest known relative. The two species are distinguishable as follows.

*Trifolium somalense*

FIG. 1. Roots, natural size. FIG. 2. Shoot with post anthesis inflorescences, slightly enlarged. FIG. 3. Inflorescence at anthesis, slightly enlarged. FIG. 4. Stem showing stipular sheaths $\times 2$. FIG. 5. Leaflet $\times 2$. FIG. 6. Post anthesis flower $\times 4$. FIG. 7. Calyx $\times 5$. FIG. 8. Vexillum $\times 5$. FIG. 9. Ala $\times 5$. FIG. 10. Carina $\times 5$. FIG. 11. Pistil $\times 6$.

T. cheranganiense

1. Roots not tuberous.
2. Stems prostrate, sometimes rooting at the nodes.
3. Free tips of stipules almost as long as sheathing part.
4. Leaflets cuneate or cuneate-oblong, rounded or emarginate at the tip.
5. Main lateral nerves c. 9-12 on each side, at an angle of c. 20° with the midrib.
6. Teeth on leaflets weakly developed and well spaced.

T. somalense

- Roots tuberous.
 Stem erect or ascending.
- Free tips of stipules less than $\frac{1}{4}$ as long as sheathing part.
 Leaflets elliptic or elliptic-oblong, acute.
- Main lateral nerves 25-40 on each side at an angle of 60-70° with the midrib.
 Teeth on leaflets well developed and very numerous.

How to Identify Plants.*—Preceding the main text of Bentham and Hooker's well-known Handbook of the British Flora, there is a section entitled 'Outlines of Botany', containing a mass of most valuable though condensed information about the technical terms used by botanists, together with hints on classification and collecting. The book under review is somewhat reminiscent of 'Outlines of Botany', endeavouring to cover much the same field, though in comparison improved by the introduction of numerous small, simple, but on the whole adequate text-figures; suitably expanded and emended in certain ways to suit the tastes of the transatlantic botanical tyro; and composed by that method of typography which suggests hybridisation between the typewriter and the printing-press.

Much of the book is taken up with glossaries, which are on the whole adequate, although the student may be bewildered by the definition of 'axile' as 'in the axil' and of 'axillary' as 'in or related to the axis'. There is also too much of a certain laxity of definition that involves treating adjectives as though they were nouns: thus, to choose one example from many, 'coalescent' is described as 'Union of parts of the same kind'.

The chapter on pressing and collecting plants contains many useful hints, although without any mention of the manifold uses of the polythene bag. Also, although the book is aimed at students, is it really necessary solemnly to inform them that they can get about while botanising by 'Automobile, train, horse, bicycle, boat or walking' (p. 95)? A more serious omission is the failure to give any advice on how to preserve the more 'difficult' sorts of plants—aquatics, succulents and so on. The student is enjoined to collect bulbs, corms and rhizomes, but the use of sectioning and splitting to cope with the more bulky of these organs in the press is not mentioned.

There is also a chapter on the principal manuals and floras of the United States, with maps showing the areas covered.

Although this book contains much of value to the student, a little more care in its production might so easily have improved it very greatly.

J. P. M. BRENNAN.

* 'How to Identify Plants' by H. D. Harrington, illustrated by L. W. Durrell. Published by Sage Books, Denver, Colorado, U.S.A. 1957. Pp. 203, with 531 figures and 5 maps, in text. Price \$3.00.

Notes on Malaysian Ferns, with descriptions of a new genus and new species

R. E. HOLTUM

Parathyrium, a new genus of Ferns, with comments on *Cornopteris* Nakai

Various authors have commented on the doubtful position of the species originally described as *Aspidium boryanum* Willd. In Christensen's *Index Filicum* (1905) this species was included in the comprehensive *Dryopteris*, but when that complex is resolved into its very diverse elements, *A. boryanum* Willd. does not fall clearly into any of them. Christensen himself (*Dansk Bot. Ark.* 7: 63, 1932) stated that *A. boryanum* and some allied species 'agree with several Asiatic species of *Athyrium*' and that 'the natural treatment would be to refer these species to a new genus near *Athyrium* or to a sub-genus of it'. He did not however establish such a new genus. Tagawa transferred *A. boryanum* to *Athyrium* in 1935 (*Acta Phytotax. et Geobot.* 4: 144) and Ching also adopted this position (*Lingnan Sc. Journ.* 15: 396, 1936). When preparing my book on the ferns of the Malay Peninsula (1954) I also placed the species in *Athyrium* (p. 567) but unfortunately I confused it with another species which is a true *Athyrium* (or *Diplazium*). Copeland (*Gen. Fil.* 123, 1947) transferred the species to *Ctenitis*. Finally, Madame Tardieu-Blot has transferred it to the genus *Cornopteris* Nakai (*Mem. Inst. Sci. Madag.* B, 7: 30, 1956; also *Amer. Fern Journ.* 48: 32, 1958).

In October 1957, and in the following months, I visited several times the forest on Mt. Gedeh in Java, near the Tjibodas garden (part of the Kebun Raya Indonesia of Bogor), and there saw *A. boryanum* growing abundantly, and along with it was *Hemionitis opaca* Don (*Dryopteris opaca* of the original *Index Filicum*) which is very close to the type species of *Cornopteris* and was transferred to *Cornopteris* by Tagawa in 1939. I compared these two species carefully, and was convinced that they did not belong to the same genus. I am equally sure that *A. boryanum* does not belong to the genus *Ctenitis*.

As regards *Ctenitis*, *A. boryanum* differs from that genus in having only two vascular bundles at the base of the stipe, these joining upwards to form a single strand which is U-shaped in section; in *Ctenitis* there are always several separate small round bundles throughout the stipe. Further, *A. boryanum* has long-persistent very fleshy stipe-bases attached to the rhizome (I have seen at least twenty, all still alive and succulent), as compared with rather woody, dry stipe-bases usual in *Ctenitis*. The septate hairs on rachises and costae of *A. boryanum* are larger and much less abundant than the characteristic short hairs of *Ctenitis*, but resemble the hairs on some species of *Athyrium* (sens. lat.).

Aspidium boryanum differs from *Cornopteris opaca* especially in the structure of the rachis (fig. 1). This structure in the former species is very much as in *Ctenitis*, in the latter essentially as in *Athyrium* and *Diplazium*, shown in fig. 320 (p. 542) of my *Ferns of Malaya*. The significant feature of the *Athyrium*

rachis is the deep groove in the upper surface, this groove being open to admit the groove of a branch of higher order, the decurrent basisopic edge of the latter being raised; midribs of leaflets are also grooved, the groove of a rachis being open to admit the midrib-groove, which is also interrupted at the veins. In *Athyrium* the edges of this rachis-groove, at the junctions, are winged; in *Cornopteris opaca* the wings are hardly present, but the arrangement of the grooves is the same, the only difference being the presence of fleshy horn-shaped outgrowths (whence the name *Cornopteris*) at the junctions of the main rachis with its branches. In *Aspidium boryanum*, on the other hand, the rachises are slightly grooved, but the grooves are not open at the junction of branches or of leaflets. *Cornopteris opaca* also differs from *Aspidium boryanum* in having elongate sori which have no trace of an indusium, and in not having a fleshy rhizome with many long-persistent fleshy stipe-bases.

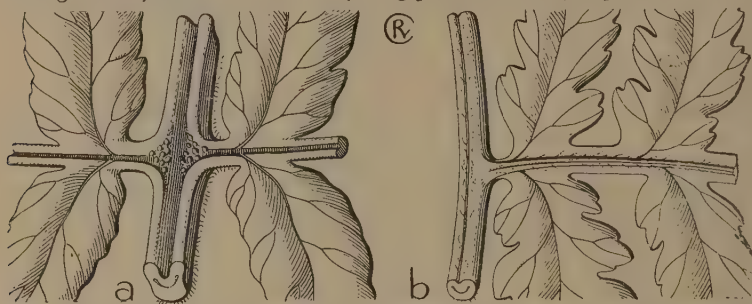


FIG. 1. a, *Cornopteris opaca* (Don) Tagawa; b, *Parathyrium boryanum* (Willd.) Holtt. Part of main rachis, with bases of pinnae, drawn from plants in cultivation at Kew, $\times 3$; a from Java, b from Ceylon.

Ching made a more careful statement about *Cornopteris* than any other author (*Lingnan Sc. Journ.* 21: 32, 1945) and described some new species. He stated that the sori were always elongate and exindusiate.

Most of the species transferred by Madame Tardieu-Blot to *Cornopteris* appear to be related to *Aspidium boryanum*, not to true *Cornopteris*, and every one is indusiate. One of them was evidently transferred by error. It was originally cited as '*Cornopteris oosora* (Bak.) Tard. comb. nov. de Java' (without citation of basionym), the basionym being specified in the second paper as *Nephrodium oosorum* Bak., of Borneo. The type of the latter is however clearly a *Cyclosorus*, and probably Madame Tardieu had intended to transfer *Asplenium oosorum* Bak., which in my view is a true *Athyrium* (or *Diplazium*); it is nearly allied to the species of *Athyrium* which I confused with *Aspidium boryanum*, as above noted, in *Ferns of Malaya*.

Among the other species transferred to *Cornopteris* by Madame Tardieu is *Aspidium tenuisectum* Bl. (usually placed in *Cystopteris*); this is certainly not nearly related to the original species of *Cornopteris*, and I do not think it is congeneric with *Aspidium boryanum*. For *Aspidium boryanum* and its near allies, I propose the new genus *Parathyrium*.

Parathyrium Holtt., gen. nov.

Rhizoma repens, stipitum veterum bases carnosas longe persistentes ferens; bases stipitum paleis tenuibus, integris, basi latis, vestiti, intus fas-

ciculis vascularibus duobus (supra basin fasciculo uno U-forme) instructi; frondes bipinnatifidae vel tripinnatifidae, pinnae vel pinnulae profunde pinnatifidae, lobis lobulatis ala angusta costae conjunctis; rhachides supra leviter sulcatae, sulcus rami rhacheos ad confluentem rami superioris non apertus; rhachides, costae et costulae utrinque pilis (in vivo pallidis, in sicco fuscis) laxis, pluricellularibus, basi non carnosis, plus minusve vestitae; venae liberae, simplices vel furcatae; sori rotundi vel elongati vel athyrioidei, indusiati; sporae perisporio instructae.

Species typica: **Parathyrium boryanum** (Willd.) Holtt. (*Aspidium boryanum* Willd., Spec. Pl. 5: 285, 1810).

The following additional species appear to belong to this genus. I have not seen good material of the rhizome of some of them, but *P. macdonellii* and *P. viridifrons* certainly agree in rhizome-characters with *P. boryanum*. Probably other known species, in *Dryopteris* or *Athyrium*, also belong to *Parathyrium*.

Parathyrium pterorachis (Chr.) Holtt., comb. nov.

Basionym: *Athyrium pterorachis* Chr., Bull. Herb. Boiss. 4: 668, 1896.

Distr.: Japan.

Parathyrium macdonellii (Bedd.) Holtt., comb. nov.

Basionym: *Asplenium macdonellii* Bedd., Journ. Bot. 27: 73, 1889.

Distr.: N.W. Himalayas.

Parathyrium viridifrons (Makino) Holtt., comb. nov.

Basionym: *Athyrium viridifrons* Makino, Bot. Mag. Tokyo 13: 15, 1899.

Distr.: China and Japan.

Parathyrium forsythii-majoris (C. Chr.) Holtt., comb. nov.

Basionym: *Dryopteris forsythii-majoris* C. Chr., Dansk Bot. Ark. 7: 63, 1932.

Distr.: Madagascar.

Parathyrium parvisorum (C. Chr.) Holtt., comb. nov.

Basionym: *Dryopteris parvisora* C. Chr.; Ark. for Bot. 14, pt. 19: 5, 1916.

Distr.: Madagascar.

Parathyrium unifurcatum (Bak.) Holtt., comb. nov.

Basionym: *Nephrodium unifurcatum* Bak., Journ. Bot. 26: 228, 1888.

Distr.: China and Japan.

Parathyrium boryanum itself has a very wide distribution. I have seen specimens from the following countries; East Africa, Comoro Islands, Réunion (type locality), Ceylon, N.E. Himalayas, Yunnan, Malay Peninsula, Sumatra, Java, Bali, Borneo, Luzon. Some specimens are a good deal larger than others, but in essential features they agree pretty well together. However, there are indications that the species is not uniform cytologically. Prof. I. Manton has examined two plants in cultivation at Kew, one sent from Ceylon by Dr. W. A. Sledge, the other by me from Sumatra; the former is an apogamous triploid, the latter a sexual diploid. The basic chromosome number is 40, thus agreeing with *Athyrium*. Mehra and Verma

have also reported a diploid specimen with $n=40$ from Northern India (*Ann. Bot.*, N.S., 21: 457, 1957).

For the preparation of fig. 1, I am indebted to Flora Malesiana.

The genus *Cerosora* Domin, with description of a new species

In 1887 Baker published a new species, *Gymnogramme chrysosora*, and established for it a new section *Cerosora*, on the grounds that waxy powder was confined to the sori and completely absent from sterile fronds (*Journ. Linn. Soc. Bot.* 24: 260). This species is still only known from the type specimen (at Kew) collected by Forstermann at Bintulu in Sarawak (mis-spelled Biululu by Baker). In the original *Index Filicum* (1905) Christensen retained the species doubtfully in *Gymnogramme*; he had not seen the type specimen. The same is true of van Alderwerelt van Rosenburgh, who transferred the species to *Ceropteris* (= *Pityrogramma*) in his *Handbook to Malayan Ferns* (1908, p. 529). When Domin undertook a monograph of the genus *Pityrogramma*, he examined the type specimen of *G. chrysosora* and noticed for the first time the presence of rigid hairs instead of scales on rhizome and stipes, a character not mentioned by Baker. On this account, Domin raised Baker's section *Cerosora* to generic rank (*Acta Bot. Bohem.* 8: 3, 1929). The occasion of the present note is the collection by Dr. W. Meijer of a second species of *Cerosora*, in Sumatra; this species is described below.

The yellow waxy powder of the type specimen of *C. chrysosora* is apparently associated with the numerous paraphyses which accompany the sporangia. These paraphyses usually consist of three cells, two elongate and translucent, the apical one shorter, slightly swollen and yellowish. The wax is probably produced by the apical cell, as by the terminal cells of the much shorter hairs of *Pityrogramma* (illustrated by De Bary, *Comp. Anat.* p. 99, fig. 43), but the state of the specimen is such that this cannot be clearly seen. The yellow powder is most abundant on a frond bearing sporangia which are not quite ripe; it has mostly disappeared from leaflets bearing ripe sporangia. No yellow powder is evident on Dr. Meijer's specimen, but it has similar paraphyses; the powder may have been destroyed in the process of preparation of the specimen.

The fronds of *Cerosora* are not large, but they are bipinnate. In form, they are not greatly dissimilar from some species of the genus *Eriosorus* Fée of tropical America, which also has hairy rhizomes and sporangia spread along the veins, but in *Eriosorus* there are no paraphyses nor any waxy powder. In the Malayan region there are no other ferns closely allied to *Cerosora*, but the genera *Taenitis*, *Schizolepton* and *Syngramma* agree in bristly rhizomes, the presence of paraphyses, and in grooved stipe and rachis, the thickened edge of the lamina decurrent on the edges of this groove. A note on these genera follows the description of the new *Cerosora*.

***Cerosora sumatrana* Holtt., sp. nov.**

Rhizoma ignotum. Stipites c. 15 cm. longi, rubidi, basin versus pilis crassis septatis vestiti, cetera glabri, intus fasciculo vasculare U-forme instructi. Frondes 12–20 cm. longae, bipinnatae, pinnis utrinque 10–15; pinnae oblique ascendentes, maximae 4–6 cm. longae, pinnulis pluribus apicem versus decrescentibus; rhachis glabra, supra sulcata, margo basis copicus

laminae pinnularum incrassatus et in margine sulci rhacchos decurrens; pinnulae sessiles, 9–12 mm. longae, rhomboideae, basi anguste cuneatae, profunde trilobatae (lobis sinibus triangularibus separatis), lobi lobulati, lobuli ultimi interdum leviter incisi; venulae liberae, furcatae, occultae; pinnulae praeter soros glabrae; sori longitudinem totam venularum occupantes, sori maturi superficiem laminae obtegentes; paraphyses numerosae, breves, filiformes, septatae, cellula ultima sphaeroidea glandulosa; sporangia magna, subsessilia, annulo lato instructa; spora pallides, triletae, grosse verrucosae, ala hyalina plana transversa instructae.

TYPE: W. Meijer 3959, Harau canyon, Pajakumbuh, Sumatra, alt. 600 m, under dripping water (herb. Leiden).

This species differs from *C. chrysosora* (Bak.) Domin in larger fronds with more dissected leaflets, the ultimate lobes or teeth narrower and acute. In *C. chrysosora* the largest leaflets are trilobed, the lobes with broad apices which are slightly toothed at apices of the veins.

Harau canyon is a narrow gorge with precipitous sides of sandstone rock, in the Padang Highlands of Sumatra. Where small waterfalls descend the sides of the gorge, there are dense growths of bryophytes, and in them some peculiar small vascular plants which include an undescribed species of *Taenitis*, and this *Cerosora*. The habitat is peculiar in the very low mineral content of the water, and probably the high acidiy.

The genera *Schizolepton* Fée, *Taenitis* Willd. and *Syngramma* J. Sm.

The only known species of *Schizolepton* Fée was originally described as *Schizoloma cordatum* Gaud. (*Ann. Sci. Nat.* 3: 507, 1824), being one of the three original species of *Schizoloma*; the others were *S. billardieri* and *S. guerinianum*. In his *Genera Filicum* (1850–52), Fée transferred *S. cordatum* to the new genus *Schizolepton*, and *S. guerinianum* to *Isoloma* J. Sm., leaving *S. billardieri* in *Schizoloma*, where he also included other species related to it. Subsequent authors limited the genus *Schizoloma* in various ways, but the bulk of the species included in it were in all cases allied to *S. billardieri* (which is either a synonym of *Lindsaea ensifolia* Sw., or a close ally). Copeland has rightly pointed out that there is no clear generic division between the genus *Lindsaea* and a genus *Schizoloma* typified by *S. billardieri*. His solution is to transfer *S. billardieri* and its allies to *Lindsaea*, and, having done so, he needs a new type species for *Schizoloma*; as type species, he selects *S. cordatum*. (*Gen. Fil.* p. 55). Kramer has objected to this procedure (*Acta Bot. Neerl.* 6: 102, 1957) and I concur in his judgement. Fée was the first to point out that the original *Schizoloma* consisted of three discordant elements, and to remove two of them, so that he had the right to decide which species should remain in the genus. The type species of *Schizoloma* should thus be *S. billardieri*, and the generic name *Schizolepton* should be used for *Schizoloma cordatum*.

Copeland writes as follows concerning *S. cordatum* (*Gen. Fil.*, p. 55): 'related to *Taenitis*, in spite of being indusiate'. But, as pointed out by Fée (*Gen. Fil.* p. 89) there is no true indusium, of the kind found in *Lindsaea*. The sorus of *Schizolepton* lies in a submarginal groove, the two edges of the groove being of equal substance, a condition closely similar to that of *Vittaria* (to which genus Fée compared *Schizolepton*). Developmental studies are needed

to establish the origin of the groove, but it looks probable that one edge of the groove is the true leaf-margin, the other an outgrowth from the surface of the frond; such a development could arise by evolution from a linear superficial sorus like that of *Taenitis*. (The development in *Vittaria* is quite comparable, with all stages from a superficial sorus to one in an apparently marginal groove, but I do not think that *Vittaria* and *Schizolepton* are related). *Schizolepton* resembles *Taenitis* in venation, in the stiff hairs on the rhizome (quite different from the scales of *Lindsaea*) and in the presence of elongate non-glandular paraphyses in the sori, the paraphyses developing first and protecting the young sporangia (Fée's drawing of a paraphysis shows no division into cells and is misleading). Sterile plants of *Schizolepton* are in essentials like *Taenitis*.

Schizolepton cordatum has a fairly wide distribution in the southern Philippines, Moluccas and Borneo (I believe also Celebes), but it is not common in herbaria. This may be due to a restricted type of habitat. During a recent visit to Kuching, Sarawak, I saw specimens collected from limestone at Bau, not far from Kuching. The species had not been collected at any other locality, and it may be restricted to limestone.

I agree with Copeland that *Schizolepton* and *Taenitis* are closely related, but in my view these two genera are not closely related to *Lindsaea*. I had always thought that *Taenitis* was related to *Syngamma*, on account of the species *Syngamma pinnata* J. Sm., which appears to bridge the gap between the two genera (Copel., *Gen. Fil.* pl. 1). Recently however Prof. I. Manton has made chromosome counts from plants grown at Kew of *Taenitis blechnoides* and *Syngamma alismifolia* which I sent from Malaya and Sarawak. The *Taenitis* has a haploid number approximately 44, the *Syngamma* 58 (2×29); the latter thus agrees with the count of $n = 116$ (4×29) for *S. quinata* published in the appendix to my *Ferns of Malaya* (p. 627, fig. 20).

This information has caused me to think again about *Syngamma* and *Taenitis*, and to look for differences. There is an obvious difference in the venation, which anastomoses freely in *Taenitis*, near the margin only in *Syngamma*. There is also a significant difference in the paraphyses. In *Taenitis blechnoides* the paraphyses are very numerous and grow before the sporangia. They are simple hairs, with two or three basal cells long and slender, those in the apical part much shorter (about as long as wide) and numerous. In old sori these apical cells shrivel and become brown, but when placed in an alkaline bleaching solution they swell again and show their shape very clearly. The apical cell is not glandular nor different from the others. Copeland writes of *Taenitis* (p. 56) 'sporangia slender-stalked, mixed with peculiar paraphyses which suggest abortive sporangia'. I think he must have seen young sporangia which had shrivelled on drying. The paraphyses certainly consist of a single row of cells, as figured long ago by Beddome (*Ferns Br. India* pl. 54, 1866) though Beddome's artist did not show that the basal cells are elongate. The paraphyses of *Syngamma*, on the other hand, have a red-brown spherical apical cell of glandular aspect, very different from the other cells which are all long, slender and translucent when living (the apical cells do not exude any waxy powder). On examining *Syngamma pinnata*, I find that the paraphyses are like those of *Taenitis blechnoides*, not like those of the Malaysian species of *Syngamma*.

Syngamma pinnata has fronds which, when sterile, are quite like those of *Taenitis blechnoides*, being identical in venation with that species, and different from typical *Syngamma*. Fertile fronds are very variable, as shown well in Copeland's plate. In some cases the sori consist of small patches of irregular shape scattered along the pinnae about half-way between midrib and edge; these look rather like a *Taenitis* sorus which has been cut into many pieces and has spread a little along the veins. There are gradations from this condition to one in which the sori spread rather thinly almost all along the veins, much as in typical *Syngamma*.

In my opinion *Syngamma pinnata* belongs to the genus *Taenitis*, with which it agrees in frond-form (there is no true *Syngamma* with comparable pinnate fronds), in venation, and in paraphyses. I therefore propose the new combination ***Taenitis pinnata*** (J. Sm.) Holtt.

After removal of this species, the genus *Syngamma* appears to be a natural one, and quite distinct from *Taenitis*.

As indicated in my *Ferns of Malaya* (p. 579) I do not consider that Copeland's genus *Craspedodictyum* is sufficiently distinct from *Syngamma* to warrant separation. Copeland states that there are no paraphyses in the sori, but they are abundantly present in the species native in the Malay Peninsula. I have called this species *S. quinata* (Hk.) Carr., but it should probably have a new name (the type of *S. quinata* was from the Pacific). I cannot see any paraphyses on the type specimen of *S. quinata*, the sori of which are old. Specimens of similar aspect from New Guinea, with ripe sori, also appear to lack paraphyses. It seems therefore that the presence of paraphyses is not a constant character in *Syngamma*.

A new species of *Bolbitis* from the Malay Peninsula

Bolbitis nitens Holtt., sp. nov.

Rhizoma repens, c. 5 mm. diam., apice paleis vestitum; paleae cellulis translucentibus parietibus fuscis constitutae, acuminatae, basi peltatae, ad 2.5 mm. longae et 0.7 mm. latae, margine ciliis sparsis instructae. Stipites conferti, frondium sterilum vulgo 4-8 cm. longi, frondium fertile 20 cm. vel ultra longi, paleis patentibus ad 3.5 mm. longis dense vestiti. Frondes steriles simplices, apicem acuminatum versus proliferae, vulgo 30 cm. longae, 5-6 cm. latae, margine leviter et irregulariter sinuatae, lamina supra atro-viride nitente, infra pallida; costa et costulae infra paleis angustis et pilis laxis septatis multis instructae; costulae 6-8 mm. inter se distantes, angulo c. 70° e costa patentes, fere rectae, utrinque prominentes; venulae vix prominentes sed utrinque evidentes, arcus convexos irregulares inter costulas formantes, venulae liberae paucae, breves, plerumque excurrentes. Frondes fertiles simplices, ad 20 cm. longae et 1.5 cm. latae, infra omnino sporangiis obiectae; costulae c. 4 mm. inter se distantes; sporae perisporio aliforme plicis transversis paucis instructo involuatae.

TYPE: B. E. G. Molesworth-Allen 3384, Ginting Simpah, Selangor, c. 800 ft. alt., on erect quartzite outcrop in primitive forest (herb. Kew.).

Mrs. Allen notes as follows concerning the habitat of this species. 'This peculiar outcrop of white quartzite (?), of c. 100 × 60 feet, apparently becomes very dry. This may well simulate a more seasonal climate than is

experienced by the ferns in the normal rain forest a few yards away. I should think there are several hundred plants in this one locality, but none shows any signs of bearing pinnate fronds. The growth (apart from this fern), is sparse, and includes *Nephrolepis falcata* (hanging from the top, which is still under the forest canopy), *Vittaria scolopendrina*, *Asplenium pellucidum* (neither fertile) *Athyrium tomentosum* (probably) and several other ferns with dead fronds'.

This species has been found by former collectors near Ginting Simpah, but never fertile. Mrs. Allen reports that she has also found the species in a similar habitat in Sarawak, but I know of no other habitat in the Malay Peninsula.

The fronds of *B. nitens* are thinner than those of *B. diversifolia* (Bl.) Schott, are always simple, have a shining upper surface, more scaly stipes, and are always proliferous near the apex. *B. diversifolia* only grows on moist rocks in and beside streams; young plants have simple fronds of about the same shape and size as those of *B. nitens*, but older plants always have pinnate leaves with dull upper surface, never proliferous.

The genus *Paesia* in Malaysia

The original species of *Paesia* was *P. viscosa* St. Hilaire, described from Brazil in 1833. Two other species had however been described previously, in the genus *Pteris*, namely *Pteris rugulosa* Lab. (1824) from New Caledonia and *Pteris scaberula* A. Rich. (1832) from New Zealand. The former species has been recorded as occurring also in Luzon but the only specimen so named at Kew (Loher 1134, named by Christ) is *Paesia radula* (Bak.) C. Chr., which was originally described from a Sumatran specimen of Beccari in 1880, but proves to have a distribution extending to New Guinea. Two other species were subsequently described from Luzon, *P. luzonica* Christ (1908) and *P. elmeri* Copel. (1910). Van Alderwerelt van Rosenburgh also described *P. lamiana* from New Guinea in 1924. All species are plants of open places on mountains.

The object of the present note is to call attention to the fact that *Paesia elmeri* occurs also in Sumatra and the Malay Peninsula, having hitherto been known by the name *Hypolepis bivalvis* v.A.v.R. The author of the latter species noted that it might perhaps belong to the genus *Paesia*, and I overlooked this fact when preparing my book on the ferns of the Malay Peninsula (*Ferns of Malaya*, p. 318, 1954).

There is no doubt that the genera *Hypolepis* and *Paesia* are closely related. This relationship has been further confirmed by recent chromosome counts. Brownlie has reported $n=26$ for *P. scaberula*, and $n=52$ and 104 for *Hypolepis* (*New Phytol.* 56, 207-209, 1957). *Paesia* differs from *Hypolepis* in having sori which normally unite the apices of several veins (for which reason several species were first described in the genus *Pteris*) and also in the possession of an inner indusium, as in *Pteridium* (which also has a chromosome number 52). In the species *Paesia elmeri* the sori are often short, confined to the acroscopic margins of the small lobes of the ultimate leaflets, and sometimes they occur, as in *Hypolepis*, at the ends of single veins. More often however they unite two vein-endings and sometimes more than two.

Paesia elmeri is known in the Malay Peninsula from only two localities, both on sandstone rock at altitudes of 1250–1500 m. One locality is at Fraser's Hill, a holiday resort occupying several mountain ridges and the intervening valleys of a small area of the Main Range of the peninsula. The mountains here are composed of granite, which weathers to a deep soil and carries a very luxuriant forest of great floristic complexity. One ridge however is composed of white quartzite, which weathers to a very poor sandy soil and carries a quite peculiar flora. On clearings and exposed places on this quartzite ridge (these clearings are mostly man-made and recent) *Paesia elmeri* forms extensive thickets. The other locality is Gunong Tahan, an isolated mountain composed entirely of sandstone, the upper ridges of which carry a thin forest of *Leptospermum* and *Baeckia*; the higher parts of the ridges (up to 2150 m.) are often bare sandstone rock with stunted woody plants in the crevices. It seems that *Paesia elmeri* is adapted to poor sandy soils where many species of plants could not establish themselves.

One of the characters of *Paesia* is a more or less zig-zag main rachis bearing alternate pinnae. Field observations of *Paesia elmeri* show that the apex of the rachis rests while each pinna in turn develops, and herbarium specimens of other species appear to indicate that they also have a similar habit of growth, though this may not be true of the smaller species. I have called attention elsewhere (*Phytomorphology* 7: 174–175, 1957) to the biological significance of periodic dormancy in thicket-forming ferns. In all other cases known to me such ferns have opposite pinnae, and the rachis-apex rests while a pair of pinnae develop (*Gleicheniaceae* in general, *Odontosoria aculeata* (L.) J. Sm., *Hypolepis brooksiae* v.A.v.R., and *Dennstaedtia scandens* (Bl.) Moore). Not all species of *Hypolepis* show periodic dormancy of the rachis; it is interesting that *H. brooksiae*, which does show such dormancy, does not agree with *Paesia*, but does agree with *Dennstaedtia scandens*. Those species of *Dennstaedtia* which have been examined cytologically show a chromosome number different from that of *Hypolepis* (Manton & Sledge, *Phil. Trans. Roy. Soc., B*, 238: 145, 177, 1954), but they are not species of scrambling, thicket-forming habit. As noted by Copeland (*Gen. Fil.* 51), *Dennstaedtia scandens* belongs to a distinct group of species, and he considers that these are more nearly related to *Hypolepis* and *Paesia* than are the majority of species of *Dennstaedtia*.

Systematic Botany.*—Within the confines of 188 pages of text, this book contrives to give an outline of the classification of the whole plant-kingdom, from the blue-green algae and bacteria to the angiosperms, and also to provide a surprisingly large number of text-figures, many of them old acquaintances culled from such sources as Baillon, Eichler and Strasburger. Only the principal families are described, but considerable space is given to mentioning plants of economic importance.

The system of classifying the angiosperms will probably be unfamiliar to most in this country. It was, I understand, devised by Professor W. Domke, and first published in a previous edition of this handbook, which however I have not seen. Domke's system has certain affinities with that of Wettstein, the dicotyledons preceding the monocotyledons, and the 'early' families of the former being the same in both systems although with some reshuffling.

Thereafter, however, there are wide divergences: the *Tubiflorae* and *Synandrae* (including *Compositae*) come about the middle, and the last named family is followed by the *Magnoliaceae* and the rest of the *Ranales*. The dicotyledons end with the *Parietales* and finally, as in van Tieghem's system, the *Cucurbitaceae*.

To consider only the actual sequence of orders and families in this system may however give a false impression. On the last text-page there is a diagram resembling a bicycle-wheel giving the relationship of orders within the system, but, although a brief résumé is given on pp. 117-118, the principles underlying the arrangement do not clearly emerge. From the diagram already referred to, the ancestry of the angiosperms is traced back to the pteridosperms by way of those hypothetical although indispensable proto-angiosperms, among which plants resembling the *Gnetales* are considered to have given rise to the 'early' families in the sequence. For many of the other orders or groups of orders separate lines of descent are evidently postulated, the present-day angiosperms thus having a polyphyletic descent from the proto-angiosperms. Thus closeness of position in the sequence may not necessarily denote closeness of relationship, but that adjacent groups may have followed parallel lines of descent remaining separate back into the unknown past. One cannot help feeling that this scheme, though not without its merits, is as speculative as other similar ones, and that what is wanted now is not new systems but new evidence.

The text of this handbook, in German, is exceedingly concise, as no doubt the limitations of space demanded. The information provided is insufficient for the specialist, but the book should be a valuable vade-mecum for the German undergraduate cramming before his exam.

J. P. M. BRENNAN.

* Taschenbuch der Botanik, begründet von Hugo Mische, Teil II: Systematik, ed. 12, by Walter Mevius. Pp. viii and 195; 307 figs. Stuttgart: Georg Thieme Verlag, 1958. Price DM 15.

A Manual of the Genus *Hippeastrum*.—Until 1821 plants belonging to the genus *Hippeastrum* were included in *Amaryllis*, and to this day that name is sometimes used for them in gardens. The use of *Amaryllis* in the title of the book under review* does not, however, derive from this popular usage, but stems from Dr. Traub's belief that the plant which Linnaeus described under the name *Amaryllis belladonna* (the species generally accepted as the type of the name *Amaryllis* L.) was not the South African species to which the name has been restricted since 1821 but the American *Hippeastrum puniceum* (Lam.) Urban (*H. equestre* (L.f.) Herb.).

This book, then, is about the plants usually known as *Hippeastrum*, but not all the species of that genus are included by Dr. Traub, for *H. procerum* and the species of sections *Habranthus*, *Rhodophiala* and *Phycella*, he regards as generically distinct.

The greater part of the book (pp. 36-231) deals with the genus in cultivation—history, hybridisation, propagation, cultivation, pests, exhibiting, and so on. In the earlier pages the author has discussed 'What is an *Amaryllis*?' and 'The *Amaryllis* Plant', and has given a general account of 'The Wild *Amaryllis*'. The formal botany is in three Appendixes (pp. 233-299) under the titles 'Chromosome Number in *Amaryllis* L.', 'Nomenclature', and 'The

Generic and Subgeneric Diagnoses of Amaryllis with a Key to the Known Species and their Complete Descriptions'. There are three more appendixes; one deals with Amaryllis organisations and nurseries, another with sources of commercial products, while the third is a glossary. The whole is rounded off by a bibliography and an index.

Dr. Traub has, he says, devoted his leisure time for fifty years to growing and studying Hippeastrums, and those interested in cultivating these plants will find much useful information in his book. The botanical part, however, is unsatisfactory. Many of the 'Complete Descriptions' of the species, are exceedingly short and quite inadequate by modern standards. And, what is far worse, the majority of them are transcripts from other authors. Many, including most of those of the older and better-known species such as *H. puniceum*, *H. aulicum*, *H. reginae*, etc., are from Baker's Handbook of the Amaryllideae (1888); others are copies of the original descriptions of the species; while three more are taken from the Botanical Magazine. There is nothing to indicate that these descriptions are not by Dr. Traub, but, in fact, the only descriptions by him are those of the species he has described during the years 1950-6. It is evident that Dr. Traub has not examined material of several species, and it is understandable that in such cases he must rely on the written records for his knowledge of the plants. But he has obviously seen living plants and/or dried material of some of the older species, and his failure to give first-hand accounts of them is inexplicable, while his presentation of Baker's condensed descriptions for these species is inexcusable. The naiveté, which alone can explain the blind faith shown in the work of others, is seen again in Dr. Traub's statement (pp. 19, 278) that *H. reginae* is native in west Africa as well as in America. This is based on Welwitsch's note that the plants he collected on Prince's Island (Principe in the Gulf of Guinea, not in the Congo estuary as stated on p. 19) appeared to be truly wild there, but the modern view is that the species was introduced from America; moreover the specimens appear to represent *H. puniceum* rather than *H. reginae* (see Exell, Cat. Vasc. Pl. S. Tomé, 343: 1944). It would seem that Dr. Traub's knowledge of the species rests to a considerable extent on the literature, a very severe handicap for anyone attempting to revise the taxonomy of this genus. It follows, therefore, that from a taxonomic standpoint little confidence can be placed in Dr. Traub's work.

J. ROBERT SEALY.

* The Amaryllis Manual. By Hamilton P. Traub. 8vo. pp. 338 + xiv, coloured frontispiece. 31 black and white figures. The Macmillan Co. 52/6.

Bolivian Helotiales collected by Dr. R. Singer

R. W. G. DENNIS

GEOGLOSSACEAE

Ochroglossum rufum (Schw.) Imai in Science Reports Yokohama Univ. Ser. 2, 4, 7 (1955). 1200–1300 m., Rio Suapi, Prov. Nor-Yungas, Dpto. La Paz, 9.2.1956, *Singer* B 1025. 1550 m., ravine in forest among earth and stones below Coroico, Prov. Nor-Yungas, 12.2.1956, 'pileus deep chrome', *Singer* B 1108. 1450–1400 m., on humus and earth in dense forest, Chirobamba, Prov. Nor-Yungas, 13.2.1956, *Singer* B 1108a.

B 1108 and 1108a appear to be typical *O. rufum* with 8-spored asci $120\text{--}130 \times 10\text{--}12\mu$ containing non-septate ascospores $15\text{--}45 \times 4\text{--}5.5\mu$. B 1025 tends to have larger asci, up to $160 \times 13\mu$, with an irregular number of ascospores $20\text{--}52 \times 4\text{--}7\mu$ rather like those described for *O. fumosum* (Peck) Imai. To the eye, however, the dried fruit bodies appear the same as those of other collections, with the hymenial region sharply differentiated from the stipe as in *O. rufum*. The collector's notes for B 1025 indicate an ochraceous pileus with a greenish or blackish base to the stipe.

Trichoglossum hirsutum (Pers. ex Fr.) Boud. Hist. Classif. Discom. d'Europe 86 (1907). 1400 m., on rotten twig in leaf mould of tropical forest below Mururata, Prov. Nor-Yungas, Dpto. La Paz, 9.2.1956, *Singer* B 1055. This cosmopolitan species is already known from Goyaz, Brasil.

Sclerotiniaceae

Lambertella boliviana Dennis, spec. nov.

Apothecia sparsa, superficialia, stipitata, umbrina, 1.5 mm. lata, excipulo parenchymatico; asci clavati, octospori, $65\text{--}70 \times 8\mu$; ascosporae leves, hyalineae vel pallide brunneae, 2–3 guttulae, $8\text{--}10 \times 4\mu$; paraphyses filiformes. In foliis emortuis in silvis, R. *Singer* B 1431 typus. Fig. 1.

Disc flat or convex, dark brown, receptacle concolorous, smooth, soft-fleshed, stalk smooth, slender, twice as long as the diameter of the disc. Excipulum composed of short-prismatic cells in rows at a very low angle to the surface, cells near the margin small, those of the outer rows on the lower part of the receptacle very large, $20\text{--}30 \times 12\text{--}20\mu$, with hyaline walls $1\text{--}1.5\mu$ thick; hypothecium dark brown, compact. Hyphae of the stalk parallel, the outer layers with dark brown walls. Ascus pore feebly blued by Melzer's reagent, ascospores irregularly biseriate, obconical, usually 3-guttulate, remaining a long time hyaline but ultimately light brown. In Melzer's reagent there often appears to be a septum cutting off the lower narrow end of the spore but this seems to be an illusion due to a persistent narrow band of protoplasm between two guttules. Paraphyses cylindrical with rounded tips, about 2μ wide, once or twice forked, especially near the base.

On dead fallen dicotyledonous leaves, possibly of Myrtaceae, 2000–2200 m., Cerro Uchumachi, Prov. Nor-Yungas, Dpto. La Paz, 25.2.1956, R. Singer B 1431.



FIG. 1. *Lambertella boliviana*. Apothecium $\times 20$, ascus, paraphyses and spores $\times 660$, section of margin $\times 500$.

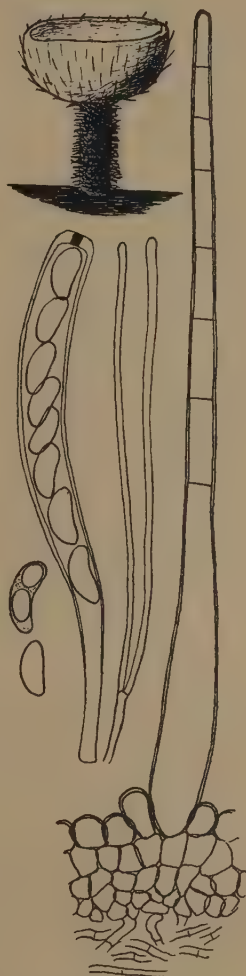


FIG. 2. *Rutstroemia hirsuta*. Apothecium $\times 12$, ascus, paraphyses and spores $\times 660$, hair and excipular cells $\times 500$.

This species seems similar to *L. jasmini* Seaver & Whetzel, from which it is distinguished by its smaller asci and smooth ascospores. The same leaves bear a species of *Coccomyces* opening by 4–5 lobes, with ascospores $75 \times 0.08\text{--}1\mu$ in asci $105\text{--}110 \times 6\mu$.

***Rutstroemia hirsuta* Dennis, spec. nov.**

Apothecia solitaria, superficialia, stipitata, usque ad 2 mm. diam., extus brunnea, setosa, stipite nigra; setae usque ad $300 \times 25\mu$, pluriseptatae, atrobrunneae, rectae, simplices. Hymenium subcupulatum vel planum, margine regulare circumdatum, umbrinum. Asci cylindraneo-clavati, brevite stipitati, octospori, $120-130 \times 11\mu$. Ascosporae uniseriatae, continuae, hyalinae, leves, $12-16 \times 4.5-5.5\mu$. Paraphyses filiformes. In petiolis putrescentibus, *R. Singer* B 1713 typus. Fig. 2.

The collector's note on the fresh material reads 'Yellow, with black stipe'. The receptacle is soft-fleshed, shrivelling somewhat and longitudinally wrinkled when dried, sparsely beset with short black hairs. The stalk is about as long as the diameter of the disc, cylindrical and completely covered with stiff spreading black hairs. In the receptacle the flesh is thick, composed of rather loosely woven hyphae $2.5-3\mu$ wide; excipulum thin, formed of compact, thinwalled, angular cells, the outermost layer larger, $7-10\mu$ across, globose to pyriform, with thicker brown walls. The hairs originate in this surface layer and taper to about 3μ at their rounded tips. Melzer's reagent stains the ascus pore deep blue. The ascospores are reniform or slightly tapered below, often 2-guttulate but apparently not becoming septate, at least while still within the ascus. Paraphyses branch near the base, their tips are rounded, not enlarged, 2μ wide.

On blackened petiole of fallen dicot. leaf in rain forest, Guayaramerin, Prov. Vaca Diez, Dpto. Beni, *R. Singer* B 1713.

This fungus is a typical *Rutstroemia* in everything but the scattered hairs, which closely resemble those of *Zoellneria*. It is clearly distinct from *R. setulata* (Dearness & House) White, in which the hairs are said to occur only in fascicles on the margin of the apothecium. Species of *Zoellneria* have the excipulum composed of parallel hyphae with prismatic cells.

***Chlorociboria musae* Dennis, spec. nov.**

Apothecia sparsa, superficialia, stipitata, usque ad 3 mm. diam., luteo-olivacea, excipulo parenchymatico; asci cylindraneo-clavati, octospori, $40-50 \times 5\mu$; ascosporae biseriatae, ellipticae, continuae, hyalinae, $5-6 \times 1.5-2\mu$. Ad folia dejecta putrescentia *Musae sapientae*, *R. Singer* B 1377, typus. Fig. 3.

Apothecia scattered, superficial, disc flat or slightly concave, 'Fresh olive yellow Maerz & Paul', drying nearly black; receptacle thin, drying dark gray-brown, stalk slender, about as long as the diameter of the disc, almost smooth, drying nearly black at the base. Flesh of the stalk formed of rather loose subparallel hyphae, about 3μ wide, with thin brown walls; hypothecium thin, compact, very dark brown in the dried material; excipulum thin, a textura globulosa with thinwalled cells $5-10\mu$ across. Ascus pore blued by Melzer's reagent; ascospores elliptic-fusiform or somewhat clavate and pointed below, paraphyses not seen.

On dead banana, Rio Yariza, Prov. Nor-Yungas, Dpto. La Paz, 23.2. 1956, *Singer* B 1377.

Dried apothecia yield a bright yellow solution when soaked up in ammonia and in this, as well as in its slightly narrower ascospores, the fungus

seems distinct from the otherwise very similar *Phialea uleana* Rehm, see Kew Bull. 1954, 323-324 (1955). It also bears a very close resemblance to the well-known *Ombrophila baumleri* Rehm, of *Alnus* catkins in Europe. Singer B 1165, probably on *Musa*, from Coroico, 15.2.1956, may be the same fungus as B 1377 but the fresh colour was not indicated and two apothecia soaked up gave no yellow reaction with ammonia.

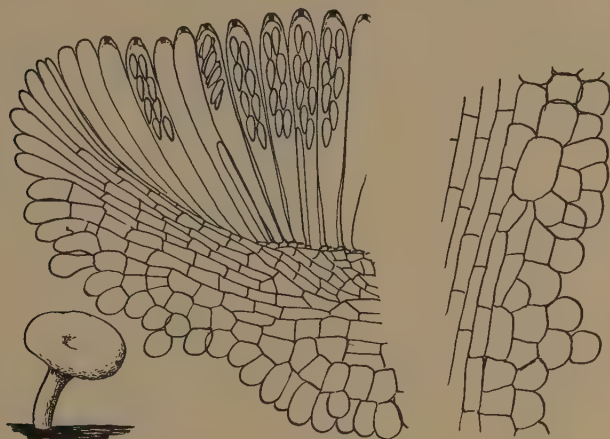


FIG. 3. *Chlorociboria musae*. Apothecium $\times 6$. Sections of margin and of excipulum of stalk $\times 660$.

Helotiaceae

Belonidium sclerogenum (Berk. & Curt.) Sacc. var. **musicola** Dennis, var. nov.

A typo ascosporis $17-25 \times 5-6.5\mu$ recedit.

Apothecia superficial, scattered, 'Pallid', drying light reddish-brown throughout, disc up to 1.5 mm. across, flat with a shallow umbilicus, receptacle saucer-shaped, smooth, stalk cylindrical, slender, shorter than the diameter of the disc. Flesh composed of slender hyphae 3μ wide; excipulum of short prismatic cells, small towards the margin, where they pass into parallel hyphae, larger and up to 17μ across on the under surface of the receptacle. Asci cylindric-clavate, 8-spore, pore outlined blue by Melzer's reagent, $100-105 \times 11-12\mu$; ascospores irregularly biseriate, elliptical, straight or slightly curved, hyaline, 3-septate, $17-23 (-25) \times 5-6.5\mu$. Paraphyses cylindrical with rounded tips, 3μ wide. 1500-1900 m., on *Musa sapientum*, Coroico, Prov. Nor-Yungas, Dpto. La Paz, 26.1.1956, R. Singer B 553.

Belonidium sclerogenum was described from palm petioles in Cuba, with 3-septate ascospores $32-39 \times 5-6\mu$, see Kew Bull. 1954, 331 (1955).

Belonidium hirtipes A. L. Smith in J. Linn. Soc. Bot. 35, 14 (1901).

'Some of the same population white, some yellow, when fresh', on plant debris, Rio Yariza, Prov. Nor-Yungas, Dpto. La Paz, 16.2.1956, *Singer* B 1188.

Helotium camerunense P. Henn. in Engl. Bot. Jahrb. 22, 73 (1895).

2400 m., on fallen dicot. trunk, Cataratas San Juan, Prov. Nor-Yungas, Dpto. La Paz, 28.1.1956, *Singer* B 620; on araceous host, same locality and date, *Singer* B 644; 1500-1900 m., Coroico, 4.2.1956, *Singer* B 891/2.

Excipulum of parallel hyphae with cells $15-20 \times 5-7\mu$; asci $130 \times 10\mu$, pore blued by Melzer's reagent, ascospores attenuated at each end, $25-35 \times 4-5\mu$. Fig. 4.



FIG. 4. *Helotium camerunense*.
Apothecium $\times 10$. Ascus and
paraphysis $\times 660$.

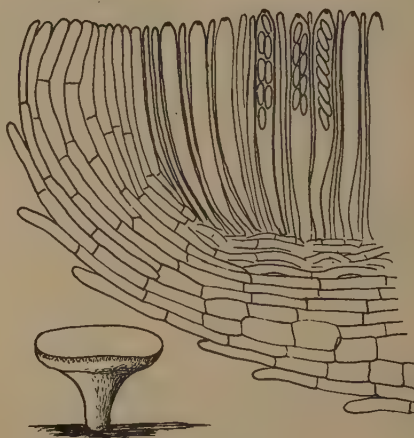


FIG. 5. *Helotium singeri*. Apothecium $\times 10$.
Section of margin $\times 660$.

Though I have not seen the type, from West Africa, this material from Bolivia agrees so well with Henning's description that it seems justifiable to adopt the name. From *H. serotinum* (Pers. ex Fr.) Fr., with which Hennings compared his species, the present fungus differs in the ascospores not being distinctly clavate. From *H. velhaense* (P. Henn.) Le Gal, as redescribed from Madagascar by Madame Le Gal, it differs in its smaller apothecia and ascospores and in the less funnel-shaped receptacle. *H. camerunense* was recorded from Brasil by Rick in Broteria, Ser. Bot. 25, 114 (1931).

***Helotium singeri* Dennis, spec. nov.**

Apothecia sparsa, superficialia, stipitata, pallida vel subrosea, usque ad 2.5 mm. diam. Asci cylindraceo-clavati, octospori, $50 \times 4\mu$; ascosporeae ellipticae, hyalinae, continuatae, $5-6 \times 2\mu$; paraphyses filiformes.

Ad pteridophyta, *R. Singer* B 1415 typus. Fig. 5.



FIG. 6. *Peltigeromyces microsporus*. Apothecium natural size, from the side, from above and below showing hole torn at the point of attachment. Section of margin $\times 50$, asci, paraphysis and portion of excipulum $\times 660$.

Apothecia scattered, superficial, disc flat, without a raised margin, 'dirty flesh pallid' when fresh, pale buff with a faint pinkish flush when soaked up in ammonia, concave and yellow when dried. Receptacle saucer-shaped, thin, concolorous, with a browner margin, drying reddish-brown; stalk concolorous, cylindrical, enlarged upwards, shorter than the diameter of the disc, minutely downy. Excipulum of parallel hyphae, with short prismatic cells about $10 \times 6\mu$ on the under side of the receptacle, passing into short cylindrical hairs at the surface. Asci narrowly cylindric-clavate, pore minute but blued by Melzer's reagent; ascospores elliptical, uniseriate or biseriate. Paraphyses cylindrical, not enlarged at the tip, about 1.5μ thick.

'On pteridophyte but seems to pass over on to dead palm leaves', 1400–1450 m., Rio Yariza, Prov. Nor-Yungas, Dpto. La Paz, 23.2.1956, *Singer* B 1415.

Judging by the description *Helotium subaurantiacum* P. Henn., on ferns in Cameroun, differs in being more tomentose, with shorter, broader, ascospores $3\text{--}4.5 \times 2\text{--}2.5\mu$.

Calycella discedens (Karst.) Dennis in Kew Bull. **1954**, 320, 1955.

1800–1900 m., on dicot. wood, Capillaria, Prov. Nor-Yungas, Dpto. La Paz, 22.2.1956, *Singer* B 1327.

Calycella sulfurina (Quél.) Boud. in Bull. Soc. Mycol. France **1**, 112 (1885).

On dicot. stick, Las Cienagas, Prov. Nor-Yungas, Dpto. La Paz, *Singer & la Sota*, B 1066.

Encoelia heteromera (Mont.) Nannf. in Trans. Brit. mycol. Soc. **23**, 239 (1939).

On dicot. log, Rio Yariza, Prov. Nor-Yungas, Dpto. La Paz, 23.2.1956, *Singer* B 1382.

Encoelia infundibuliformis (Durand) Dennis in Kew Bull. **1954**, 334 (1955).

1550 m., on wood, Rio Llolosa, Prov. Nor-Yungas, Dpto. La Paz, 31.1.1956, *Singer* B 791.

Peltigeromyces microsporus Möller apud Schimper, Bot. Mitt. Trop. **9**, 276 (1901).

Apothecia superficial, sessile, up to 3 cm. across, very much lobed and curled, disc whitish, receptacle thin, leathery, black, minutely furfuraceous. Flesh composed of hyaline hyphae 2μ thick, loosely woven in a colourless gelatinous matrix; excipulum $40\text{--}50\mu$ thick, formed of cuboid or subglobose cells, about 10μ across, the inner layers with thin brown walls, the outermost layer thick-walled. Asci cylindric-clavate, $33 \times 3\mu$, apex truncate, not blued by Melzer's reagent, 8-spored; ascospores biseriate, subglobose, $1.5\text{--}2 \times 1\mu$. Paraphyses filiform, 1μ thick. The material yields no coloured solution with ammonia or KOH. Fig. 6. 1200–1300 m., on dicot. wood in forest, Rio Suapi, Prov. Nor-Yungas, Dpto. La Paz, 9.2.1956, *Singer* B 1132.

The tips of the asci are markedly truncated and no foramen can be seen in them. It is therefore possible that, in spite of their small size, the asci are operculate like those of *Midotiopsis bambusicola* P. Henn., as described by Madame Le Gal. If this is so *Peltigeromyces* must be transferred to the Sarcoscyphaceae.

Hyaloscyphaceae

Dasyscyphus pygmaeus (Fr.) Sacc., Syll. Fung. **8**, 436 (1889).

1500–1900 m., on small rootlets, Coroico, Prov. Nor-Yungas, Dpto. La Paz, *Singer* B 853.

The above is a characteristic habitat of this cosmopolitan species, already recorded by White (1942) from England, France, Luxembourg, Germany, Sweden, Poland, Czechoslovakia, Jugoslavia, Portugal, Canada and U.S.A.

Dasyscyphus papyraceus (Karst.) Sacc., Syll. Fung. 8, 434 (1889).

1500–1900 m., on dicot. bark, Coroico, Prov. Nor-Yungas, 4.2.1956, *Singer* B 868.

Dasyscyphus brasiliensis (Mont.) Le Gal, Discom. de Madagascar 372 (1954).

1550 m., on bark, Rio Llolosa towards Coroico Viejo, Prov. Nor-Yungas, Dpto. La Paz, 31.1.1956, *Singer* B 787; 1100 m., on dead branch of *Fagara coco* in subtropical forest, Ciudad Universitaria, Sierra de San Javier, Prov. Tucuman, Argentina, 15.12.1956, *Singer* T 2849; 1500–1900 m., on dicot. wood, Coroico, Prov. Nor-Yungas, 15.2.1956, *Singer* B 1174.

Dasyscyphus flavidulus Rehm in Ann. Mycol. 7, 542 (1909).

1950–2000 m., on dead tree fern in upper zone Yungas forest, Carmen Pampa, Prov. Nor-Yungas, Dpto. La Paz, 1.2.1956, *Singer* B 818.

Dasyscyphus singerianus Dennis, spec. nov.

Apothecia sparsa, superficialia, stipitata, alba, villosa, margine piloso-fimbriato, latit. circitet 0.4 mm. Asci cylindraceo-clavati, octospori, 45–50 × 5μ, ascosporae biseriatae, ellipticae, 1-septatae, hyalinae, 7–8 × 2μ. Paraphyses crassit 2.5–3μ, apice rotundatae. Pili cupulae longissimi, apice plerumque attenuati, articulati. In stipite Dicksoniae, *R. Singer* B 602 typus. Fig. 7.

Excipulum of thin-walled prismatic cells, about 4μ wide; hairs on the margin up to 250 × 6μ, with thin minutely granulate walls, those on the flanks and stalk somewhat shorter. Fresh colour 'white to 10D2 Maerz & Paul'.

2400 m., on dead petioles and especially on the thorns of *Dicksonia* and other tree ferns, Cataratas San Juan, Prov. Nor-Yungas, Dpto. La Paz, 28.1.1956, *Singer* B 602.

Orbiliaceae

Orbilina cf. juruensis P. Henn. in Hedwigia 43, 270 (1904).

1800–1900 m., on wood, Capillaria, Prov. Nor-Yungas, Dpto. La Paz, 22.2.1956, *Singer* B 1319 'Fresh 3–5 mm. broad, sunrise yellow to rose amber, Maerz & Paul', margin finely crenate, ascospores 2–4 × 0.5μ: 2000 m., on wood, Carmen Pampa, Prov. Nor-Yungas, *Singer* B 1494, 26.3.1956.

The ascospores are small for *O. juruensis* and more like those of *O. epipora* (Nyl.) Karst. but the size and colour of the apothecia are reminiscent of the former.

Phacidiaceae

Cerion leucophaeum (Speg.) Dennis, comb. nov.

Gorgoniceps leucophaeus Speg. in Bol. Acad. Nac. Cienc. de Cordoba **11**, 589 (1889).

1500–1900 m., erumpent from bark of dicot. branch, Coroico, Prov. Nor-Yungas, Dpto. La Paz, 7.2.1956, *Singer* B 951. 'Deep dusky brownish orange on disc to deepest chestnut', dry disc pale flesh colour, pruinose. Fig. 8.

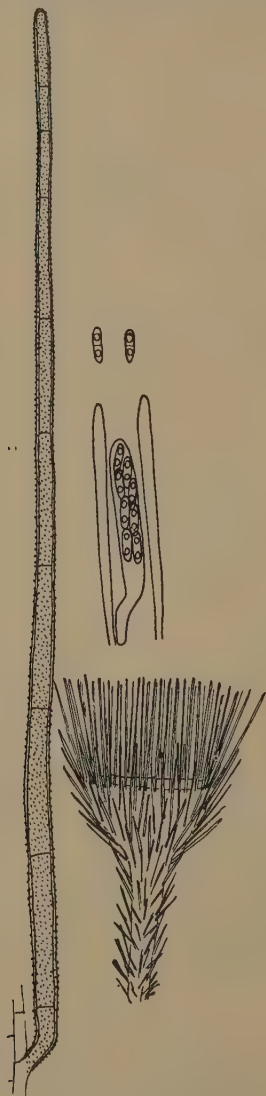


FIG. 7. *Dasyscyphus singerianus*. Apothecium $\times 50$. Hair, ascus, paraphyses and spores $\times 660$.



FIG. 8. *Cerion leucophaeum*. Apothecia $\times 15$. Ascus, paraphyses and spores $\times 660$.

Coccomyces clusiae (Lév.) Sacc. in Syll. Fung. 8, 747 (1889).

On fallen *Clusia* leaf, 1850-1950 m., north slope of Cerro Uchumachi, Prov. Nor-Yungas, Dpto. La Paz, 5.2.1956, *Singer* B 895b. The same leaf bears a few conidiophores of *Periconia byssoides* Pers. ex Schw., kindly determined by Dr. M. B. Ellis.

Tryblidiaceae

Tryblidiella rufula (Spreng.) Sacc. var. **fusca** (Ell. & Ev.) Rehm in Ann. Mycol. 2,524 (1904).

1500-1900 m., on dicot. twig, Coroico, Prov. Nor-Yungas, Dpto. La Paz, 7.2.1956, *Singer* B 592. Epithecium K-, ascospores $27-30 \times 10-12\mu$.

Endlicher's Enchiridion Botanicum of 1841.—Certain 'family' names suggested in this work require examination to decide whether they can be accepted as validly published family names under the International Code of Botanical Nomenclature (Paris, 1956). The fact that Endlicher referred to the families as 'orders' is not to be regarded as a displacement of terms in the sense of Art. 5 of the Code, but as a mere accident of terminology. Many authors of the first half of the nineteenth century regarded 'family', 'order' and 'natural order' as synonyms.

Endlicher's recognised orders are numbered; they are frequently divided into named suborders, tribes and subtribes. The endings employed are variable in all categories and cannot be used to identify rank. They are quite definitely identifiable with the families and infrafamilial categories of modern classifications.

Certain groups of genera, however, appear to be excluded from the numbered orders and are collected together under names indicating a category of suprageneric rank, and comparable in form with the names of the orders. The names are preceded by an asterisk and most of them are followed by a suprageneric description.

Many of the groupings of genera were not new, but exactly corresponded to definitive families included in Lindley's classifications of 1830 and 1836. In these circumstances, and since under the Code all genera must be assigned to families (Art. 3) it seems reasonable to regard all these Endlicher groups as of family rank, and the names as validly published, even when there is a suggestion of them being *nomina provisoria*.—A. A. BULLOCK.

Studies in the Ericales: XI.*

Further New Species and Notes on the Agapetes of Continental Asia.

H. K. AIRY SHAW

Since the publication of my last paper on *Agapetes* (*K.B.* 1948, 77-104: 1948), a large quantity of undetermined material of the genus, mostly from the collections of the late F. Kingdon Ward, has been made available to me for study. This has been found to include a dozen or so new species, and several new varieties, besides many valuable additional gatherings of better-known or little-known species. The present contribution, besides presenting descriptions of the new species and varieties, and notes on fresh gatherings of those previously described, includes also brief references to all other species from Continental Asia not already commented upon in this series. A complete index to the three papers is provided.

Sincere thanks are due to the authorities in charge of the collections at the British Museum (Natural History), and the Royal Botanic Garden, Edinburgh, for putting their valuable material at my disposal. I am also indebted to the Director of the Paris Herbarium for the kind loan of certain type-specimens.

SECTION AGAPETES

Agapetes Sect. **Agapetes**.—*Caules* varie puberuli, glandulosi vel setosi, saepe demum glabrescentes, varie rugulosi vel lenticellati, vix unquam teretes et laeves, rigidi vel flexuosi. *Folia* valde varia, sed rarissime rotundato-ovata et integra (tunc 2 cm. longitudine vix excedentia), subtus plerumque glabra, raro pubescentia vel setulosa, nunquam glanduloso-punctata.—*Characteres* florales valde varii.—*Typus*: *A. setigera* D. Don ex G. Don (Assam).

(For co-ordinate Section *Pseudagapetes*, see p. 511, *infra*).

SERIES ROBUSTAE

By comparison with the remaining series, the present series undergoes little change. Three new species (*A. dispar* A.S., *A. haemantha* A.S., *A. leptantha* A.S.) are described; *A. pulcherrima* (Hook.) Hook. f. is reduced to the status of a variety of *A. odontocera* (Wight) Hook. f.; and new varieties are described under *A. moorci* Hemsl., *A. variegata* (Roxb.) G. Don, and the rare *A. nana* (Griff.) Hook. f. A new combination is found to be necessary for *A. glabra* (Griff.) C.B. Cl. Notes on a number of other species are included.

In view of the difficulty of naming certain species in this group, a new key has been drawn up, which it is suggested may be used in conjunction with the former key, as a cross-check.

* Continued from *K.B.* 1952, 174 (1952).

Alternative Key

to Series *Robustae*.

- Pedicels expanded at the apex into a 'collarlet' of short, linear processes, surrounding the receptacle 10. **nana**
- Pedicels not expanded into an apical 'collarlet':
- Corolla widely infundibular-campanulate, 1.8 cm. long, 1-1.8 cm. in diameter at the mouth (when pressed); anther-beaks dorsally spurred 21. **campanulata**
- Corolla not widely campanulate, mostly less than 1 cm. in diameter:
- Corolla short, urceolate, less than 1 cm. long:
- Corolla about 7 mm. long; inflorescence long-peduncled, 8-10 cm. long; leaves pseudo-verticillate, 6-9.5 cm. wide 26. **dispar**
- Corolla 3-4 mm. long; inflorescence short-peduncled, 2-3 cm. long; leaves scattered, 3-7 cm. wide 27. **acuminata**
- Corolla elongate, $\pm$ cylindric, over 1 cm. long:
- Corolla distinctly curved or oblique at apex:
- Corolla divided half-way into long linear lobes 15. **lobbii**
- Corolla more shortly divided into triangular lobes:
- Filaments elongate, mostly exceeding 1 cm. in length:
- Corolla slender, less than 7 mm. wide (when pressed); inflorescence glabrous 14. **macrostemon**
- Corolla stouter, over 6 mm. wide (when pressed); inflorescence grey-pubescent 12. **moorei**
- Filaments short, mostly less than 5 mm. long:
- Leaves cuneate at base, narrowed into a petiole 8-10 mm. long; main nerves deeply impressed above and very prominent below; inflorescence glabrous 13. **nuttallii**
- Leaves less obviously cuneate, petiole shorter or absent; nerves not deeply impressed above; inflorescence variously puberulous and/or glandular-setose 11. **setigera**
- Corolla quite straight at apex:
- (A) Anther-beaks spurred on the back (dorsally calcarate):
- Leaves ovate, obovate, or broadly elliptic, with a very distinct intra-marginal nerve:
- Leaves obovate, almost entire; marginal nerve very strong; petiole less than 5 mm. long; inflorescence densely glandular-setose 3. **marginata**
- Leaves mostly elliptic, often shallowly indented-crenate; marginal nerve slenderer; petiole over 5 mm. long; inflorescence puberulous or (var. *glabra*) glabrous 4. **pubiflora**
- Leaves lanceolate, oblanceolate, or narrowly elliptic:
- Calyx-segments large, elongate-lanceolate:
- Leaves very large, 16-24 $\times$ 5-7 cm.; inflorescences axillary or from old wood 1. **burmanica**
- Leaves smaller, 10-18 $\times$ 2-5 cm.; inflorescences apparently terminal:
- Inflorescence about 10-flowered, axis 3-4 cm. long, pedicels angled 5. **hillii**
- Inflorescence 2-4-flowered, axis 1 cm. long, pedicels $\pm$ terete 6. **megacarpa**
- Calyx-segments small, triangular-deltoid or quite shortly lanceolate:
- Branches (at least the younger) very strongly and sharply angled; leaves very thin, almost papyraceous, conspicuously dentate 25. **angulata**
- Branches terete, or less strongly and more bluntly angled; leaves chartaceous or coriaceous, subentire or less conspicuously dentate:
- Corolla 3-6 cm. long, often ventricose; leaves often abruptly contracted into the petiole 17. **variegata**
- Corolla 2-2.2 cm. long, narrowly cylindric; leaves gradually narrowed into the petiole 18. **odontocera**
- (AA) Anther-beaks without spurs (dorsally ecalcarate):
- Leaves very large, 20-34 cm. long and up to 13.5 cm. broad:
- Leaves ovate, not distinctly pseudo-verticillate, with a massive petiole 2 cm. long; axis of inflorescence 2.5-8 cm. long, pedicels 3-4 cm. long; calyx 1.2-1.4 cm. long, divided about half-way; corolla about 2.5 cm. long, with rather short ovate-deltoid segments 23. **macrophylla**
- Leaves oblanceolate, pseudo-verticillate, sessile; axis of inflorescence 0.2-0.4 cm. long, pedicels 2.3-2.5 cm. long; calyx 0.5 cm. long, divided almost to base; corolla 3.5-3.7 cm. long, with deltoid-acuminate segments 2. **haemantha**
- Leaves smaller, 6-24 cm. long and 2-8 cm. broad:
- Cupular expansion at apex of pedicels very conspicuous, 4-4.5 mm. in diameter:

Receptacle (calyx-tube or inferior ovary) with a projecting ring of tissue, giving the appearance of a cup surrounding the base of the calyx-segments; leaves 9–12 cm. long 20. **brandisiana**
 Receptacle without a projecting ring of tissue; leaves 13–18 cm. long

7. **auriculata**

Cupular expansion at apex of pedicels smaller or absent:

Leaves chartaceous, conspicuously serrate-dentate:

Leaves 12–18 × 4.5–8 cm., subsessile, nerves impressed above; corolla 2.3 cm. 24. **miniata**

Leaves 5–8 × 1–2 cm., petiole slender, nerves prominulous above; corolla 1.2 cm. 28. **leptantha**

Leaves coriaceous, entire or obscurely indentate-crenate:

Leaves very narrowly oblong-oblancoelate, 0.8–2 cm. wide; corolla 1.5 cm. long 22. **salicifolia**

Leaves various, exceeding 2 cm. in width; corolla more than 1.5 cm. long:

Leaves 8–21 cm. long, 3–5.5 cm. wide, strongly pseudo-verticillate:

Inflorescences very shortly pedunculate, almost sessile

9. **sikkimensis**

Inflorescences long-peduncled 8. **affinis**

Leaves smaller, not or less strongly pseudo-verticillate; inflorescence with an evident peduncle or axis:

Leaves usually with midrib and nerves deeply channelled above and elevate below, often almost bullate, with strongly reflexed or revolute margins, mostly 6–8 cm., rarely up to 10 cm. long

16. **saligna**

Leaves with ± flat or prominulous nerves and midrib above, not bullate, margins not or less strongly reflexed, mostly more than 10 cm. long:

Corolla about 2.5 cm. long, mostly cylindric; leaves coriaceous

19. **parishii**

Corolla 4–4.5 cm. long, ventricosely widened upwards; leaves chartaceous 17. **variegata** var. **macrantha**

Subseries **Coriaceae** *Airy Shaw*. Folia plerumque coriacea, obscure crenata vel indentata vel integra, rarius distinctius crenato-dentata; flores inter majores, interdum maximi.—Typus: *A. setigera* D. Don ex G. Don.

Subseries **Chartaceae** *Airy Shaw*. Folia plerumque chartacea vel tenuiter coriacea, conspicue serrato-dentata; flores inter minores, vel pro rata parvi, interdum minimi.—Typus: *A. miniata* (Griff.) Hook. fil. (*Vide* p. 480, *infra*).

SUBSERIES CORIACEAE

1. **Agapetes burmanica** *W. E. Evans* in *Notes Roy. Bot. Gard. Edinb.* **15**, 199 (1927); *Airy Shaw* in *Bull. Misc. Inf., Kew*, **1935**, 27 (1935) et in *Kew Bull.* **1948**, 84 (1948).

Additional material:

UPPER BURMA. Kachin State: North Triangle (Hkinlum), 1200 m., 6 May 1953, *F. Kingdon Ward* 20794 (Herb. Mus. Brit.): 'A tall erect epiphytic shrub with large leathery leaves and very big pinkish flowers. Not rare in forest and on trees in second growth woodland.'

The material includes detached leaves, an inflorescence in bud, flowers just opening (detached from their pedicels), mature fallen corollas, and fruits. I am not altogether satisfied that this material is homogeneous. The calyces present are only 1 cm. long, instead of 1.5 cm. as in previous gatherings of this species.

2. **Agapetes haemantha** *Airy Shaw*, sp. nov., foliis oblanceolatis valde elongatis superne denticulatis, floribus ut videtur fere fasciculatis, calyce pro

rata parvo, corolla omnino sanguinea inferne manifeste infundibulari-angustata distincta.

Frutex epiphyticus, ramis robustis 7 mm. diametro valde et acute angulatis glabris inter foliorum pseudo-verticilla cataphyllos numerosos anguste lanceolatos 1-1.8 cm. longos basi 2-4 mm. latos gerentibus. *Folia* oblanceolata, in genere inter longissima, 26-34 cm. longa, 4-5 cm. lata, pseudo-verticillatim congesta, sessilia, basi rotundata vel subauriculato-cordata, apice acuminato-angustata, acuta, margine remotiuscule crenato-denticulata, coriacea, glaberrima, costa pro rata haud robusta subtus prominente supra impressa, nervis utrinque gracilibus pulchre reticulatis, nervo intra-marginali distinctissimo 1 mm. a margine distante, petiolo subnullo. *Inflorescentia* ut videtur subfasciculata, 12-15-flora, pedunculo cum axi 2-4 mm. tantum longo, bracteis bracteolisque multis parvis congestis, pedicellis 2.3-2.5 cm. longis gracilibus glabris apice leviter discoideo-expansis. *Receptaculum* parvum, 2-3 mm. longum, 2 mm. diametro, glabrum. *Calycis* segmenta lanceolata, 5 mm. longa, basi 1.5 mm. lata, breviter connata, subgibba, distincte carinata, margine glanduloso-denticulata, apice acutissima, corollae basin arcte amplectentia, glabra. *Corolla* superne subcylindrica, inferne infundibulari-angustata, 3.5-3.7 cm. longa (lobis inclusis), superne 8-10 mm., inferne 3-4 mm. diametro, prope basin (ubi calyce circumdata) subgibba, glabra, sanguinea, immaculata, viva lucida (teste collectore), lobis deltoideis 6 mm. longis longiuscule acuminatis demum revolutis. *Filamenta* 3 mm. longa, 1 mm. lata, applanata, basi leviter connata, apice geniculata, puberula; *antherae* (totae) 3.4 cm. longae, thecis 6 mm. rostris 2.8 mm. longis, ecalcaratae, glabrae. *Stylus* filiformis, 3.8 cm. longus, glaberrimus, stigmatibus minuto haud vel vix expanso. *Fructus* ignotus.

UPPER BURMA. Kachin State: North Triangle (Hkinlum), in the forested gorge of the Hkrang Hka, 1050 m., 9 June 1953, *F. Kingdon Ward* 20972 (Herb. Mus. Brit.): 'A shrub, epiphytic on big trees. Glabrous except for the puberulous style. Corolla glossy, blood-red. Filaments expanded at the base.'

The foliage of this species is somewhat reminiscent of that of *A. burmanica* W. E. Evans. The flowers, however, are very different, being much smaller in all their parts. There is some similarity to those of *A. hillii* Brandis, though these, again, are very much larger. The crimson colouration, without markings, suggests *A. miniata* (Griff.) Hook. f., but in that species the corolla is not strongly narrowed to the base as in the present one.

Only a single, detached inflorescence is present, and hence some doubt remains as to the length of the peduncle; but it is probably very short. Kingdon Ward's reference to the 'puberulous style' is presumably a slip for 'puberulous filaments'.

3. *Agapetes marginata* Dunn in *Bull. Misc. Inf.*, Kew, 1920, 133 (1920); Burkill in *Rec. Bot. Surv. Ind.* 10, 52, 74, 311 (1924-25).

ASSAM. Outer Abor Hills: 'an epiphyte of the oak forest found about Rengging camp at 1140 m., and then again at 1530 m., flowering in January from thick stems', 1912, *I. H. Burkill* 36340.

A most distinct species, known only from the type gathering, of which I have so far seen only a single leaf and a single inflorescence. The strong

intra-marginal nerve at once recalls that of *A. pubiflora* A.S., but the strongly glandular inflorescences are quite different. Although I included this species (1948, 79) in the section of my key characterized by: 'Leaves scattered more or less regularly along the branches', etc., there is in fact no information available on this point, either from the collector or from the material or from the original description, and I suspect that the leaves may eventually prove to be pseudo-verticillate. Burkill (*l.c.* 311) notes that the species was growing in association with *Agapetes nutans* Dunn (*vide infra*, p. 492).

A small but material amplification is needed to Dunn's original description of the stamens. The short (2 mm. long) filaments are *puberulous*, as also are the connectives in their lower portion; and the anther-tubes are shortly *spurred* 11–12 mm. from the apex. Dunn makes no reference to either of these points.

4. ***Agapetes pubiflora*** Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 27 (1935); Merr. in *Brittonia*, 4, 159 (1941); Airy Shaw in *Kew Bull.* 1948, 85, 86, fig. 2 (1948).

Additional material:

BURMA. Nam Tamai valley, 27° 50' N., 97° 50' E., 1800–2400 m., 23 Nov. 1937, *F. Kingdon Ward* 13508 (Herb. Mus. Brit.).

The type specimen of this very distinct species, *K.W.* 9118, was obtained, like the present one, in the Nam Tamai valley, but at a considerably lower altitude—only 900 m. Kingdon Ward then noted that the species was a very abundant one, 'present on almost every big tree'. It is interesting to find that it has also a wide altitudinal range.

The present specimen is quite typical, showing for instance no tendency towards the var. *glabra* A.S. (*K.B.* 1948, 87).

5. ***Agapetes hillii*** Brandis, *Ind. Trees*, 404 (1906).

BURMA. Hills east of Bhamo, 1350 m., Oct. 1901, *Montague Hill* 112: 'Epiphyte'.

This very fine species is at present known only from the type collection, unless it should ultimately prove that the next species, *A. megacarpa* W. W. Sm., from Yunnan, S. W. China, is conspecific. The apparently terminal position of the inflorescences is curious. The pedunculate corymbs of 5–6 cm.-long flowers must be exceedingly handsome.

6. ***Agapetes megacarpa*** W. W. Smith in *Notes Roy. Bot. Gard. Edinb.* 11, 194 (1919) (1920?); Airy Shaw in *Kew Bull.* 1948, 80 (1948), *in clavi*; *descr. hic amplif.*

CHINA. Yunnan: Shweli-Salwin divide, 25° 6' N., 2100 m., in open thickets, April 1917, *Forrest* 13698: 'Shrub of 20 ft. Flowers creamy yellow? Calyces ruddy.' (Type; in fruit only).

Additional material:

CHINA. Yunnan S., sine loc. vel dat., *French Consul* (per *Henry*) 242 (Herb. Edin.).

This fragmentary but welcome material, consisting of a piece of branch 12 cm. long (bearing the axes of two inflorescences), 4 detached leaves, 2

detached pedicels, calyces and styles, the remains of 1 or possibly 2 corollas, and 5 more or less intact stamens, makes possible the completion of the description of this hitherto imperfectly known species.

Pedicelli 2.2–2.3 cm. longi, glabri, sursum levissime incrassati, apice parum cupulatum expansi. *Receptaculum* breviter turbinatum, 3 mm. longum, 5–6 mm. diametro, glabrum, basi truncatum. *Calycis* segmenta subulata, 7–8 mm. longa, acuta, basi 2.5 mm. lata, fere libera. *Corolla* ut videtur $\pm$ infundibularis, 4.5 cm. longa (lobis inclusis), glabra, transverse anfractuoso-vittata, lobis elongato-triangularibus 9–10 mm. longis basi 6 mm. latis acuminatis acutis. *Stamina* 4.6 cm. longa: filamenta brevissima, 3 mm. longa, late applanata, glabra, in connectivum angustum inferne densiuscule breviter pilosum desinentia (pilis sursum decrescentibus, usque ad calcaria visibilibus); thecae anguste lineari-oblongae, 7 mm. longae, fusco-brunneae, valde papillosoe, basi appendiculo incurvo incrassato-auctae; rostra linearia, valde elongata, 3.5 cm. longa, glabra, straminea, circiter ad medium calcaribus 2 parvis patentibus 1 mm. longis instructa. *Stylus* filiformis, 4.8 cm. longus, glaber, stigmatibus parvo discoideo-capitato.

This fragmentary material confirms the points of distinction from *A. hillii* given in my key (*K.B.* 1948, 80) (short, few-flowered inflorescence, $\pm$ terete pedicels), but unfortunately adds nothing new. It is evident that the flowers are almost identical. Brandis's statement (*Ind. Trees*, 404: 1906) that the anthers of *A. hillii* are ecalcarate, is erroneous; they have small spurs about half-way up, exactly as in the present species.

8. *Agapetes affinis* (Griff.) *Airy Shaw*, comb. nov.

Thibaudia affinis Griff. *Itin. Notes (Posth. Papers, 2)*, 84, no. 1218 (1848); cf. M. L. Green in *Bull. Misc. Inf.*, Kew, 1931, 200 (1931).

Thibaudia glabra Griff. *Ic. Pl. Asiat.* t. 514 (1854), et *Notulae*, 4, 301 (1854).

Agapetes glabra (Griff.) C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 444 (1881).

Additional material:

ASSAM: Khasia Hills: Tim-Put valley, 1200 m., 15 Oct. 1913, *U. Kanjilal* 2712: 'A short erect shrub. Corolla tube brick-red, fleshy. Pedicels 1 inch or more. The fleshy corolla, which is acid, is eaten cooked as a vegetable.' Vernacular name: *soh-la-mut*.

The 'brick red' colour noted by the collector for the corolla-tube is curious: previous collectors (Griffith, Hooker, Clarke) have given it as 'pale green', 'white' or 'almost white'. The specimens seem to show no other significant difference.

In view of the strongly puberulous inflorescence of this species, the name-change now found to be necessary is to be welcomed, rather than otherwise, as getting rid of the misleading epithet '*glabra*'.

10. *Agapetes nana* (Griff.) Hook. fil. in Benth. et Hook. fil. *Gen. Pl.* 2, 571 (1876); C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 448 (1881); Brandis, *Ind. Trees*, 405 (1906).

Ceratostema nanum Griff., *Notulae*, 4, 303 (1854); *Ic. Pl. Asiat.* t. 505 (1854).

ASSAM. 'In collibus Nagensibus prope Lainkaran', 16 March 1837, Griffith (Kew Distr.) 3473.

var. **robusta** Airy Shaw, var. nov., foliis multo majoribus ellipticis 8.8–13.5 cm. longis 3.3–5.0 cm. latis subacutis vel subobtusis nullo modo acuminatis margine conspicue noduloso-incrassato distincta.

UPPER BURMA. Sumptra Bum, 1200 m., 5 March 1953, F. Kingdon Ward 22017 (Herb. Mus. Brit.): 'An epiphytic shrub. Young leaves suffused with purple, margin thickened, bristly. Inflorescence with scattered gland-tipped hairs; a palisade of these hairs forms a sort of epicalyx.'

This is only the second known gathering of this most distinct species. Griffith's original collection was in rather young bud, and, by a strange and tantalizing coincidence, Kingdon Ward's specimen is in almost exactly the same stage—if anything slightly younger. It would be most desirable to have mature flowering material.

The 'palisade' of gland-tipped hairs, or rather processes, forming a 'sort of epicalyx', is perhaps the most original feature of the plant. It is comparable to the 'collarete' of glandular bristles found in *A. serpens* (Wight) Sleumer and its allies (cf. *K.B.* 1948, 103, and *infra*, p. 499), but is of a more regular appearance and solid texture, the individual processes being subulate and comparatively robust. (The figure in Griffith's *Icones*, *l.c. supra*, is, however, formalised and exaggerated.) It is presumably homologous with the cupular expansion of the pedicel-apex seen, for example, in *A. affinis* (Griff.) Airy Shaw (*A. glabra* [Griff.] C. B. Clarke), *A. auriculata* (Griff.) Hook. fil. and *A. brandisiana* W. E. Evans, and the two first species may in fact represent the closest affinity of *A. nana*.

Ward's specimen differs from Griffith's in its much larger leaves: 8.8–13.5 cm. long and 3.3–5.0 cm. wide, as against 5.0–9.5 × 1.5–2.4 cm.; they are also subacute or subobtuse at the apex, and not at all acuminate, whereas in the type-specimen they are gradually acuminate and very acute. The outline is elliptic, rather than lanceolate-oblong, and the reflexed margin is marked by a conspicuous nodulose thickening. The short marginal bristles noted by Ward are gland-tipped; they appear to be quickly caducous, or easily abraded, since they are visible on only a few of the younger leaves in the dried material.

Neither Griffith nor Clarke gave any description of the stamens. Dissection of the oldest bud present on Griffith's specimen shows that the filaments are extremely short and, together with the connectives, rather strongly ciliate. The anthers are devoid of dorsal appendages. Corolla, anthers and style at this stage were all of equal length, 6 mm. long.

Griffith's original coloured drawing (preserved in the Kew Library), from which the plate in his *Icones*, t. 505, was prepared, shows the flower buds with 'collarete' and corolla crimson, and calyx green.

12. **Agapetes moorei** Hemsl. in *Bot. Mag.* 129, t. 7928 (1903); Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 38 (1935).

A. unwinii W. E. Evans in *Notes Roy. Bot. Gard. Edinb.* 15, 205, t. ccxxi (1927).

Additional material:

W. CENTRAL BURMA. Esakan, 1950–2550 m., 2 April 1956, *F. Kingdon Ward* 21907 (Herb. Mus. Brit.): 'An epiphytic shrub. Very abundant throughout the climax evergreen forest. Young leaves salmon. Flowers red; corolla lobes green, more or less reflexed. Pedicel and calyx pilose; corolla with scattered hairs. Stamens, style glabrous. The 10 stamens have a curious knee bend at the base, forming a pouch into which honey is injected. Anthers tailed at base, opening by pores'. Mindat Ridge, 2250 m., 21 May 1956, *F. Kingdon Ward* 22254 (Herb. Mus. Brit.): 'An epiphytic undershrub in forest.' [In fruit only].

In *K.W.* 21907 the largest leaves are 11–12 cm. long and 5–5.5 cm. broad, and the calyx is 8–9 mm. long with rather longer and narrower segments than the type, agreeing in the latter respect with the type of *A. unwinii* W. E. Evans. But there is no doubt about the identification, the species being a very distinct one.

var. **glabrescens** *Airy Shaw*, var. nov., receptaculo et calyce (nisi intus) glabris.

W. CENTRAL BURMA. Mount Victoria, 1924, *R. E. Cooper* 6073 (Herb. Edin.).

One of the most distinctive features of *A. moorei* being its normally densely grey-tomentellous receptacle, this form with a glabrous receptacle presents a very unusual appearance.

13. **Agapetes nuttallii** *C. B. Clarke* in Hook. fil. *Fl. Brit. Ind.* **3**, 445 (1881); *Airy Shaw* in *Bull. Misc. Inf.*, Kew, **1935**, 32 (1935).

Additional material:

ASSAM. Rupa, 1200–1500 m., 22 Oct. 1935, *Kingdon Ward* 12458 (Herb. Mus. Brit.): 'Flowers green. An epiphytic shrub. Also on gneiss cliffs.'

As stated previously (1935, *l.c.*), this species has hitherto been known only from the type specimen, collected by Booth (for Nuttall) in Bhutan in 1849. The present specimen agrees with the type perfectly. The axis of the inflorescence may be as much as 11 cm. long. The slight but distinct apical curvature of the corolla, to which attention was drawn previously (*l.c.*), is clearly visible.

The envelope attached to the sheet contained (in addition to a single flower, lacking the corolla, of *A. nuttallii*) two detached inflorescences of *A. variegata* (Roxb.) D. Don ex G. Don var. *variegata* [var. *glabrata* (C. B. Cl.) A.S.], and one flower probably of *A. miniata* (Griff.) Hook. fil. It is possible that these may represent what the collector took for *A. nuttallii* 'also on gneiss cliffs', but may of course also be due merely to an accident in mounting.

14. **Agapetes macrostemon** (*Kurz*) *C. B. Clarke* in Hook. fil. *Fl. Brit. Ind.* **3**, 443 (1881).

Vaccinium macrostemon Kurz in *Journ. As. Soc. Beng.* **42** (2), 85 (1873), et **46** (2), 213 (sep. pag. 165) (1877); *For. Fl. Brit. Burma*, **2**, 87 (1877).

BURMA. Martaban: not unfrequent in the hill forests, especially the drier ones, of the Martaban hills east of Tounghoo, at 1200 to 1800 m. elevation.—Fl. March.—*Kurz*.

Additional material:

BURMA. Southern Shan States: Lakut Taung, Molye, in open scrub forest, over 1500 m., Feb. 1910, *W. A. Robertson* 131: 'Epiphyte. Stems very gnarled. Flowers red with green teeth, no bands.'

This collection in Herb. Kew. (from the herbarium of J. S. Gamble) appears not to have been recorded before. The leaves are only 7–11 cm. long; Clarke's measurements gave 'up to 15 cm.'

A. macrostemon is, as its name implies, characterized by its long filaments, 8–12 mm. long. This is very unusual in the Series *Robustae*; compare also *A. moorei* Hemsl.

15. ***Agapetes lobbii*** C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* **3**, 448 (1881); Airy Shaw in *Bull. Misc. Inf.*, Kew, **1935**, 37 (1935), *q.v.*

Agapetes racemosa Watt ex Kanjilal, Das et De, *Fl. Assam*, **3**, 139 (1939).

Additional material:

ASSAM. Manipur State: Naga Hills, hill behind Kohima (Polibagley or Polybadgley), 1800 m., 28 Feb. 1882, *Watt* 6180 (Herb. Edin.): 'A large epiphyte, with tubers a foot in diameter. Leaves alternate, shining green. Flowers in racemes, pink. Ovary inferior. Stamens 9 [sic!], yellow, long-beaked, free from corolla but subcoherent.'

Agapetes lobbii was described by Clarke from an early collection of Lobb from the Moulmein district of Burma. But Dr. George Watt, attached to the Government Demarcation Survey of 1881–82, had meanwhile collected abundant material in the Naga Hills of Assam. Failing to recognise his species as the *A. lobbii* of Clarke's account in the *Flora of British India*, which had just appeared, he drew up a description of it, as a supposed new species, *Agapetes racemosa* Watt, a name which will be found on the labels of many of his duplicates in various herbaria. This name, with an English description, has unfortunately been taken up and published (*in addition to A. lobbii* C. B. Cl.) by Kanjilal *et al.* in their recent *Flora of Assam* (*l.c.*).—A first draft of Watt's description, evidently drawn up from living material, is attached to his no. 6180 in Herb. Edin. and is here reproduced as bringing out very clearly the distinction between this species and the superficially similar *A. saligna* (Hook. f.) Hook. f.

'A nearly allied species to *A. saligna* H.f. & T.T. But it is at once separated from that species on reference to the inflorescence, which in *saligna* is a corymb, with the peduncles of different lengths and over one inch long; whereas in *racemosa* it is a long raceme from 2 to 3 [inches] long, with peduncles all equal and from $\frac{1}{2}$ to $\frac{3}{4}$ in. long. Corolla uniform, not dilated as in *saligna*, and tube more than half split into narrow linear acute lobes. Calyx teeth very narrow. Flower pale pink. This should belong to a section not in *Flora Indica* [*scil.* *Fl. Brit. Ind.*] with infl. racemose; corolla more than half cut into narrow teeth. Leaves ovate from a rounded cuneate base, much acuminate, as long as the racemes.'

16. **Agapetes saligna** (Hook. fil.) Hook. fil. in Benth. et Hook. fil. *Gen. Pl.* 2, 571 (1876); C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 444 (1881); Cowan & Cowan, *Trees N. Bengal*, 80 (1929); Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 37, in obs. (1935), et in *Kew Bull.* 1948, 80, in clavi (1948) (sed N.B.—vide notulam infra!); vel *sp. nov.*?

Vaccinium salignum Hook. fil. *Ill. Him. Pl.* t. 15, fig. A (1855).

Additional material:

UPPER BURMA. Kachin State: North Triangle (Hkinlum), 900 m., 30 April 1953, *F. Kingdon Ward* 20748 (Herb. Mus. Brit.): 'A large straggling shrub, epiphytic or hanging from big rocks in the bed of the Hkrang Hka (river). Fruits covered with waxy white bloom. Leaves with long drip tip (caudate-acuminate apex).'

This specimen, which bears no flowers but abundant infructescences, differs markedly from typical *Agapetes saligna* of Sikkim in the very short (up to 1 cm. long) peduncle of the corymbs, and in the very small (1–2 mm.), deltoid calyx-segments. *A. saligna* has, moreover, hitherto not been known east of Bhutan, and the present specimen, if correctly named, would therefore represent a considerable extension of range. It may ultimately be found to be specifically distinct.

I take this opportunity of drawing attention to an unfortunate error in my key to the Series *Robustae* in *K.B.* 1948, 80, in which the names *A. lobbii* C. B. Cl. and *A. saligna* (Hook. f.) Hook. f. are transposed. The species with the deeply divided, oblique-tipped corolla is, of course, *A. lobbii*.

17. **Agapetes variegata** (Roxb.) D. Don ex G. Don, *Gen. Syst.* 3, 862 (1834); Airy Shaw in *Kew Bull.* 1948, 88–90 (1948), *q.v.*

var. **variegata**.

Agapetes variegata var. *glabrata* (C. B. Clarke) Airy Shaw, *l.c.*

Additional material:

BHUTAN. Mirichoma, 1050 m., 21 Nov. 1914, *R. E. Cooper* 3673 (Herb. Mus. Brit.): 'Fine pink flowers, 2½ inches long'.

ASSAM. Manipur State, 12–1800 m., 15 April 1882, *Watt* 6935 (Herb. Edin.): 'An extremely common epiphyte, growing in bifurcations of stems of oaks and other trees and developing enormous pseudo-tubers as big as a man's head. Flowers large, sweetly scented, pink with purple transverse patches. Filaments short; anthers long, straw yellow, with 2 hooks on outside and near the middle.'

Cooper's specimen apparently represents the first record of this species from Bhutan, although it has long been known from the Mishmi and Naga Hills of Assam.

var. **bhareliana** Airy Shaw, var. nov., propter folia sessilia cordata primo aspectu var. *speciosae* (Hemsl.) A.S. similis, sed foliis elliptico-ovatis acuminato-caudatis margine superne minute sed distincte remote denticulato-serratis, floribus minoribus tantum 2·7 cm. longis differt.

ASSAM. Valley of the Bhareli, in jungle, 900–1200 m., 26 Oct. 1935, *F. Kingdon Ward* 12477 (Herb. Mus. Brit.): 'An epiphytic shrub. Flowers cherry red, teeth green.'

It is without enthusiasm that one puts forward yet another 'variety' of this variable species, but the characters mentioned, especially the unusual leaf-characters, appear to make it unavoidable. So far as I know, no other *Agapetes* has been obtained by Ward or any other collector in the Bhareli valley.

18. *Agapetes odontocera* (Wight) Hook. fil. in Benth. et Hook. fil., *Gen. Pl.* 2, 571 (1876); Airy Shaw in *Kew Bull.* 1948, 87, 88 (1948); *vel sp. aff.*

Vaccinium odontocera Wight, *Jc. Pl. Ind. Or.* 4 (1), 4, t. 1187 (1848).

Additional material:

BHUTAN. Baksa Duars, 600 m., 17 April 1915, *Cooper* 3738 (Herb. Mus. Brit.): 'Epiphyte on tree. Flowers long, red, veined.'

UPPER BURMA. Adung, 28° 1' N., 27° 46' E., 1170 m., 2 Nov. 1938, *R. Kaulback* 154 (Herb. Mus. Brit.).

In spite of the field notes attached to Cooper's specimen regarding the flowers, no flowers are present on the sheet; the specimen consists merely of two bare branches and six detached leaves. The identification is therefore given with considerable reserve. The leaves are, however, a very close match of those of *A. odontocera*, although rather more strongly pseudo-verticillate than is usual in that species.

Kaulback's specimen, on the other hand, is without leaves, consisting of a leafless moss-covered branch bearing 3–4 good inflorescences. Dissection of the flowers reveals the small dorsal spurs, rather high up on the backs of the anther-tubes, that are peculiarly characteristic of *A. odontocera* (and whence it derives its name), and the flowers are in other respects typical of the species.

var. **pulcherrima** (Hook.) Airy Shaw, stat. nov.

Thibaudia pulcherrima Hook. in Hook. *Bot. Mag.* 73, t. 4303 (1847).

Caligula pulcherrima (Hook.) Klotzsch in *Linnaea*, 24, 28 (1851).

Agapetes pulcherrima (Hook.) Hook. fil. in Benth. et Hook. fil. *Gen. Pl.* 2, 571 (1876).

ASSAM. Khasia Hills, cult. *Lucombe, Pince & Co.*, Exeter; *Wallich* (fide Hooker). Nungklow, 1200 m., April 1847, *Lobb*: 'Shrub, 5 feet.'

I believe that this plant must be regarded as a large- and thin-leaved form of *A. odontocera*. The existence of the *Lobb* specimen, gathered in the wild state, proves, however, that the characters observed in the type material are not due merely to cultivation. I would also refer to var. *pulcherrima* the following rather poor specimen, consisting of a branch with 5 leaves and 3 flowers only—deficiencies which are, however, somewhat compensated by the field notes, some of which would appear to require interpretation!

ASSAM. Cachar: 'got in Jelinga kookee teelah (?) karee. B. mara. Lot kimafik gathsh', 10 April 1873, *R. L. Keenan*: '? if growing in the soil or

parasitical. Woody; leaves oblanceolate, smooth, entire, more or less whorled; flowers in clusters, often coming out of the leafless portion of the stem, ped. thickened upwards, cal. 5 toothed, cor. cylind. 5 angular, mouth 5 lobed, lobes ov. lanc. patent, their margins revolute, tube of cor. of a waxy appearance, whitish creamy with numerous transverse wavy small red lines—cor. externally and internally homochromous; stam. with very long anth. united; anthers syngen., brown, with deflexed hairs in the middle.' (On separate label:) 'This is an interesting and beautiful plant; it is probably distinct from the sp. obtained from Doarbund. The flowers are quite N. American in type. I have seen the affinity near Vacciniaceae in the Kew Herbarium.'

20. **Agapetes brandisiana** W. E. Evans in *Notes Roy. Bot. Gard. Edinb.* **15**, 201, fig. 1c (1927); Airy Shaw in *Bull. Misc. Inf. Kew*, **1935**, 32 (1935).

Additional material:

BURMA. Bhamo District: Sinlum Res., 1710 m., 18 Feb. 1927, *Law Maung Mya* 4951 (Herb. Kew., Herb. Edinb.): 'Straggling shrub. Fruit pinkish red. Root fusiform and medicinally used.'

21. **Agapetes campanulata** (Kurz) C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* **3**, 449 (1882).

Vaccinium campanulatum Kurz in *Journ. As. Soc. Beng.* **42** (2), 85 (1873), et **46** (2), 214 (sep. pag. 166) (1877); *For. Fl. Brit. Burma*, **2**, 89 (1877).

BURMA. Martaban: not infrequent in the stunted hill forests near the top of Nattoung, at about 2100 m. elevation.—Fl. March.—Kurz.

Although stated by Kurz to be 'not infrequent', this species appears never to have been collected since, and further material is very desirable. The leaves are very similar to those of *A. macrostemon* C. B. Clarke. It is one of the ten or so species of Series *Robustae* with dorsally spurred anthers (cf. key), between which, however, there appears to be no evidence of any specially close relationship.

22. **Agapetes salicifolia** C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* **3**, 445 (1881).

ASSAM. Mishmi Hills: Koond rocks, 1837, *Griffith* (Kew distrib.) 3477: 'Ceratostemma flor. miniat. laciniis viridibus, calyce pedunculisque miniatis.'

No further material of this somewhat isolated species has yet been seen. The very narrowly oblanceolate, entire, coriaceous leaves, with close, conspicuous, elevate nerve-reticulation on both surfaces, and rather short, glabrous racemes of flowers with small (1.5–1.6 cm.), cylindrical, shortly lobed corollas, form a very distinctive combination of characters. The entirely crimson inflorescence (corolla-lobes excepted) is noteworthy.

The undetermined fruiting specimen collected by Kingdon Ward (no. 7977) in the Delei valley, and referred to in *Kew Bull.* **1935**, 38, looks superficially very much like a more broad- and short-leaved form of *A. salicifolia*, but is probably specifically distinct.

Agapetes (vel **Vaccinium**) sp. nov.? aff. *A. bulleyanae* Diels et forsan *A. miniatae* (Griff.) Hook. f.

TIBET-BURMA FRONTIER. Ridge above Laktang, on bare granite cliff, 2400 m., 23 May 1919, *F. Kingdon Ward* 3050 (Herb. Edin.): 'Ericaceae (fruit only). Small shrub (undershrub) of 1-2 feet. Fruit and calyx delicate pearly green. Generally epiphytic on trees.'

A very tantalizing specimen, consisting of a stout, bare branch bearing a small side-branch with a single leaf and a single infructescence. The leaf is elliptic-ovate, somewhat acuminate, 15 cm. long and 6 cm. broad. The texture, bullate nervation, and colour (discolorous) on drying, are extremely similar to those of *A. bulleyana*; the pale toothed margin, especially, is almost exactly as in that species.* The small round lenticels of the branchlets, and the practically umbellate inflorescence, are also distinctive characters of *bulleyana*. The similarity to *A. miniata* lies principally in the size, shape and tooting of the leaves; the inflorescence is considerably different. From both these species, however, Ward's specimen differs in the strongly puberulous pedicels and receptacle, and in the long, narrow, puberulous calyx-segments.

Dr. Sleumer (1941, Engl., *Bot. Jahrb.* **71**, 478) includes *A. bulleyana* in the genus *Vaccinium*. Personally I would be inclined to retain it in *Agapetes*, on account of the umbellate inflorescence and elongate corolla. I would do this with almost all species with umbellate, corymbose or fasciculate inflorescences. The species is one of the comparatively small number in which, as regards the question '*Agapetes* or *Vaccinium*?', it is practically 'six of one and half-a-dozen of the other.'

SUBSERIES CHARTACEAE

The following five species, together with *A. macrophylla* C. B. Clarke, stand somewhat apart from the main body of the series, in their relatively thin, conspicuously toothed leaves, and small (or proportionately small) flowers. According to the collectors' notes, in some of the species the pedicels and/or calyx are bright red or pink, and the corollas are sometimes green, or of a translucent texture. It is therefore convenient to distinguish the group as above. Further material, or additional new species, may suggest the desirability of treating the group as an independent series.

24. **Agapetes miniata** (Griff.) Hook. fil. in Benth. et Hook. fil. *Gen. Pl.* **2**, 571 (1876); C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* **3**, 445 (1882); Brandis, *Ind. Trees* 404 (1906); Airy Shaw in *Kew Bull.* **1948**, 78 (1948), *in clavi*.

Ceratostemma miniatum Griff. *Notul.* **4**, 302 (1854) et *l.c.* *Pl. Asiat.* t. 504 (1854).

Vaccinium miniatum (Griff.) Kurz in *Journ. As. Soc. Beng.* **42** (2), 85 (1873), et **46** (2), 214 (1877).

Additional material:

ASSAM. Mishmi Hills: Glo Lake, Kamlang valley, 1050 m., 28 March 1949, *F. Kingdon Ward* 18462 (Herb. New York B.G.): 'An epiphytic shrub, not large, growing on orchid-laden trees which lean out over the lake.

* I have not yet seen material of *A. bulleyana* var. *tenuifolia* Anthony (1933, *Notes Roy. Bot. Gard. Edinb.* **18**, 18).

Flowers sheer crimson, very handsome and conspicuous, in axillary fascicles.' *Ibid.*, above the lake, 1800 m., 25 April 1949, *F. Kingdon Ward* 18553 (Herb. New York B.G.): 'A big-leaved epiphytic undershrub, seen only once in the forest. Probably collected in the Delei valley (1928)'.

Previously obtained only by Griffith in the Patkoy (Naga) Hills and by Clarke in the Khasias, at comparable altitudes. Ward's material is quite typical, bringing the maximum leaf measurement up to 22 cm. His remark concerning a former collection in the Delei valley probably refers to his gathering of *A. macrophylla* C. B. Clarke, another very large-leaved species (*K.W.* 8032—see *K.B.* 1935, 26), to which *A. miniata* certainly shows some relationship.

The 'sheer crimson' of the corollas (commented on also by Clarke, as well as by Ward) would appear to be a characteristic feature of *A. miniata*. Compare also *A. haemantha* A.S., above. The measurement of '1¼ inches' (3 cm.) given for the corollas by Clarke, appears to be excessive. In all the collections I have examined the corollas have been 2–2.5 cm. long.

25. ***Agapetes angulata*** (Griff.) Hook. fil. in Benth. et Hook. fil. *Gen. Pl.* 2, 571 (1876); C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 447 (1881); Burkill in *Rec. Bot. Surv. India*, 10, 52, 74, 311 (1924–25); Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 30 (1935), et in *Kew Bull.* 1948, 85 (1948).

Ceratostema angulatum Griff. *Notul.* 4, 302 (1854) et *l.c. Pl. Asiat.* t. 503 (1854).

ASSAM. Hukung valley, Nullah, 1500 m., 15 March 1837, Griffith (Kew distrib.) 3471: '*Ceratostema* sp. nov. ramis angulatis, fl. hyalini laciniis revolutis carnei sanguineo-venosi et praesertim transverse, racemis pendulis. Frutex.'

Additional material:

UPPER BURMA. Kachin State: North Triangle (Arahku), 1200 m., 3 April 1953, *F. Kingdon Ward* 20606 (Herb. Mus. Brit.): 'A straggling epiphytic shrub. Flowers crimson, mostly fallen.'

Each fallen leaf, with its axillary inflorescence, leaves behind on the stem a pair of superposed nodulose projections, forming a conspicuous feature along the bare angled stems of this species.

26. ***Agapetes dispar*** Airy Shaw, sp. nov., ex affinitate *A. miniatae* (Griff.) Hook. f. et *A. acuminatae* D. Don ex G. Don, quibuscum folia plus minus chartacea conspicue denticulata communia habet; ab *A. miniata*, quacum foliis amplis ovato-lanceolatis congruit, inflorescentia longe (6 cm.) pedunculata et corolla abbreviata urceolata (7 mm. longa) discrepat; ab *A. acuminata*, pariter corollis parvis urceolatis et foliis interdum satis amplis gaudente, inflorescentiis longe pedunculatis discedit.

Frutex epiphyticus, caulibus 4–5 mm. diametro, cortice brunneo conspicue lenticellato. *Folia* per 2–3 pseudo-verticillata (verticillis 11–18 cm. inter se distantibus), ampla, subsessilia, late ovata usque ovato-lanceolata, 13–18 cm. longa, 6–9.5 cm. lata, basi rotundata vel leviter cordata, apice breviter acuminata, acuta, margine plano distincte sed brevissime denticulato siccitate pallido venuloso, chartacea, utrinque glaberrima, siccitate

supra obscure fusca, subtus laete castanea; costa satis robusta, subtus prominens, supra impressa et simul anguste prominula, nervis lateralibus valde conspicuis angulo lato (inferioribus angulo fere recto) patentibus marginem versus procurvis et arcuato-anastomosantibus 10–12-paribus gracilibus subtus argute prominentibus supra subbullato-impressis; petiulus brevissimus vel subnullus. *Inflorescentiae* corymbosae, pendulae, longipedunculatae, 8–10 cm. longae, 20–25-florae, in speciminibus suppetentibus ex axillis foliorum ut videtur parcissime exortae, sed (teste collectore) etiam e ramis annotinis vel vetustioribus (forsan copiosius?) editae; pedunculus circiter 6 cm. longus, gracilis, glaber, sursum sensim incrassatus; pedicelli 2–2.5 cm. longi, graciles, superne incrassati, apice levissime cupuliformiter expansi, glabri, rosei (teste collectore). *Receptaculum* parvum, obconicum, 1–2 mm. diametro, glabrum. *Calycis segmenta* lanceolata, c. 3 mm. longa, basi brevissime connata, acuta, glabra. *Corolla* parva, urceolata, 6–7 mm. longa; ei *A. acuminatae* similis sed duplo major, ubi latissima 3–4 mm. lata, sursum angustata, ore 2 mm. diametro, superne (praesertim secus angulos) patentim puberula, pallide viridis; lobi parvi, circiter 1 mm. lati, late triangulari-ovati, obtusi, erecti, lateribus reflexis, intus papilloso. *Stamina* 5–6 mm. longa: filamenta e basi lata subulata, 2 mm. longa, parce breviter ciliata; thecae fere 2 mm. longae, papillosoe, in rostra 2.5 mm. longa haud rigida ecalcarata subsgmoideo-desinentes. *Stylus* fere 7 mm. longus, modice robustus, glaber, stigmatum parvo capitato subsphaerico. *Fructus* ignotus.

BURMA. Nam Tamai valley, 28° N., 97° 45' E., 1800–2100 m., 12 Sept. 1937, *F. Kingdon Ward* 13234 (typus, Herb. Mus. Brit.): 'An epiphytic shrub, common along the open ridge on the edge of the forest. Leaves very large. Flowers just opening, pale green and white.' *Ibid.*, 28° N., 97° 40' E., 2100–2400 m., 27 Oct. 1937, *F. Kingdon Ward* 13434 (Herb. Mus. Brit.): 'A common epiphyte along the ridge, mostly in thickets.' '22 November. Now in full bloom. Flowers in large pendent bunches from the old wood, pale green, pedicels pink. Corolla minutely pubescent outside and within round the short teeth. Anthers with long erect horns, no processes. Very common in the moss forest, 2100–2400 m.'

The alliance of this well-marked species is evidently with *A. miniata* and *A. acuminata*. The large, thin, denticulate leaves are very similar to those of *A. miniata*, the most obvious difference being in the angle of the lateral nerves—ascending in *miniata*, widely spreading in *dispar*. The small corollas show an evident approach to those of *acuminata*, and help to link on that species to the rest of the genus; but the long-peduncled inflorescences are very different, being reminiscent rather of those of *A. glabra* (Griff.) C. B. Clarke. This last species has also, as it happens, rather shortly cylindrical corollas, though quite different foliage.

The epithet *dispar* emphasizes the curious disparity between the large leaves and the small corollas of this species.

27. **Agapetes acuminata** *D. Don ex G. Don, Gen. Syst.* 3, 862 (1834); DC. *Prodr.* 7, 554 (1839); Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 25, 30 (1935), *in obs.*

Thibaudia acuminata Wall. *Numer. List*, no. 6297 (1832), *nomen*.

Epigynium acuminatum (D. Don ex G. Don) Klotzsch in *Linnaea*, **24**, 51 (1851); Hook. fil. in Hook. *Bot. Mag.* **83**, t. 5010 (1857).

Vaccinium acuminatum (D. Don ex G. Don) Kurz in *Journ. As. Soc. Beng.* **46** (2), 214 (sep. pag. 166) (1877); *For. Fl. Brit. Burma* **2**, 90 (1877).

Corallobotrys acuminata (D. Don ex G. Don) Hook. fil. in Benth. et Hook. fil. *Gen. Pl.* **2**, 575 (1876); C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* **3**, 455 (1882).

ASSAM: Khasia Hills: Silhet, *Wallich*; frequently collected since.

In spite of its very small flowers, there seems no doubt that *A. acuminata* should be referred here. *A. dispar* A.S. and *A. miniata* (Griff.) Hook. f. evidently bridge the gap to the more typical members of the genus. Clarke (*l.c. supra*) and Kurz (*l.c.*) have reported it from Bhutan and Burma, respectively, but I have not yet seen specimens from these countries.

28. *Agapetes leptantha* *Airy Shaw*, sp. nov., ex affinitate *A. angulatae* (Griff.) Hook. f. et praesertim *A. acuminatae* D. Don ex G. Don, sed foliis minoribus 5-8 cm. longis, inflorescentiis gracilibus, calycis segmentis minimis patentibus, corolla gracili, filamentis elongatis puberulis, antherarum rostris apice quasi fimbriatis distinctissima.

Suffrutex parvus epiphyticus. *Rami* elongati, flexuosi, teretes, usque 3 mm. diametro, glabri, lenticellis multis minimis notati, dissite foliati. *Folia* elongate elliptica, 5-8 cm. longa, 1-2 cm. lata, sursum sensim attenuata sed vix acuminata, acutissima, deorsum in petiolum sensim decurrenti-angustata, margine distincte et remote serrato-dentata, glaberrima, chartacea, siccitate supra nigrescentia et nitidula, subtus viridula vel obscure brunnea et opaca, costa nervisque gracillimis pulchre reticulatis praesertim supra prominulis, petiolo gracili circiter 1 cm. longo anguste alato. *Inflorescentiae* racemosae, gracillimae, 1-4 cm. longae, glaberrimae, usque 15-20-florae, bracteis bracteolisque minutis subulatis, pedicellis gracilibus 5-8 mm. longis sursum leviter incrassatis. *Receptaculum* parvum, subglobosum, 1-1.5 mm. diametro, glabrum. *Calycis* segmenta minuta, deltoidea, acuta, patula, glabra. *Corolla* anguste cylindrica, 1.1-1.3 cm. longa, 2-2.5 mm. diametro, extra glabra, intus sursum puberula, pallide viridula, dein rubido-tincta (teste collectore), lobis parvis ovato-deltoides 1-1.5 mm. longis et latis acutiusculis recurvis intus puberulis. *Filamenta* elongata, gracillima, 6 mm. longa, patentim pubescentia, basin versus levissime ampliata. *Antherae* lineares, 6 mm. longae, thecis vix 2 mm. longis basi velut ustulatis grosse papillois brevissime caudatis, rostris rectis 4 mm. longis membranaceis ecalcaratis apice mire modo in fibrilla breviter fimbriato-solutis. *Discus* pro rata magnus, gibbus, annulari-pulvinatus. *Stylus* gracilis, 1.2-1.3 cm. longus, glaber, sub apice minutissime scaberulus, stigmatibus conspicue discoideo-capitato. *Fructus* ignotus.

BURMA-TIBET FRONTIER. Nam Tisang, 900 m., 11 Nov. 1922, *F. Kingdon Ward* 5541 (Herb. Edin.): 'Small epiphytic bush in the forest. Flowers pale green, later taking on a reddish tinge.'

A very distinct and interesting species. The leaf-texture, nervation, and remotely toothed margin, and the habit of the inflorescence and small spreading calyx-segments, clearly indicate an affinity with *A. acuminata* and, to a lesser extent, with *A. angulata*. The corolla, and especially the

androecium, however, show some unexpected features. The corolla is unusually slender and delicate for the genus, and the filaments are very elongate. Owing to this, the unexpanded flower-buds exhibit a conspicuous gibbosity just above the middle, where the anthers are situated. But the really unique feature lies in the anther-tubes, which at the apex are as it were 'frayed out' into a small tuft of fibrils, where they project from the mouth of the corolla, and are overtopped by the conspicuous pin-head stigma. This fibrillose anther-tube structure is something that I have seen in no other species of *Agapetes*, and is presumably associated with the method of pollination.

The foliage is also quite strongly reminiscent of that of *Vaccinium scopulorum* W. W. Sm.—In one flower dissected, a small Dipterous larva was found, and the bases of several filaments, adjoining a small hole in the base of the corolla, had been eaten away; cf. note under *A. trianguli* A.S., p. 511 *infra*.

SERIES PTERYGANTHAE

I now incline to attach less importance, in certain cases, to the winged calyx or corolla, than to the habit, the foliage, and especially the apical 'collar' of glandular setae on the pedicel, possessed by certain species formerly referred to this series. These species are accordingly transferred to the Series *Graciles*. With these transferences, and the description of two new species, it is now found that in the majority (6: 2) of the species of this small series the anthers are dorsally ecalcarate. The following changed circumscription of the Series is proposed.

Habitus varius; *folia* mediocria vel parva; *inflorescentiae* nunquam elongatae; *calycis* tubus conspicue pentagonus vel quinque-alatus, segmentis saepe amplis; *corolla* saepe flava; *filamenta* brevissima; *antherae* saepius dorso ecalcaratae.

There is perhaps some connection between this series and the Subseries *Chartaceae* of Series *Robustae*: compare the foliage of *A. flava* and *A. incurvata* with that of *A. miniata* (Griff.) Hook. f., and the strongly angled stems of *A. interdicta* with those of *A. angulata* (Griff.) Hook. f.

Two subseries may be recognised:

Subseries **Bullatae** *Airy Shaw*. *Folia* majora, usque vel fere usque ad basin conspicue serrata; costa et nervi conspicue bullato-impressi; *antherae* dorso calcaratae.—Typus: *A. incurvata* (Hook. f.) Sleumer.

Subseries **Planifoliae** *Airy Shaw*. *Folia* minora, apice vel parte distali tantum serrata, vel omnino integra; nervi haud vel raro bullatim impressi; *antherae* dorso ecalcaratae.—Typus: *A. interdicta* Hand.-Mazz.

REVISED KEY TO THE SPECIES

Leaves serrate throughout, or occasionally entire at the extreme base; nerves bullately impressed above; anthers spurred on back (Subser. **BULLATAE**):

Entire inflorescence (including corolla) minutely but evidently puberulous; calyx large, about 1.5 cm. long; corolla yellow 1. ***A. flava*** (Hook. fil.) Sleumer

At least the calyx glabrous; calyx smaller 2. ***A. incurvata*** (Griff.) Sleumer

Leaves serrate only in the distal half or at the apex, or quite entire (rarely one or two teeth below the middle); nerves not or rarely (*A. smithiana*) bullately impressed; anthers ecalcarate (Subser. **PLANIFOLIAE**):

Corolla elongate-cylindric, 2–3 cm. long; calyx 1–2 cm. long:

- Leaves quite dull above, toothed in the distal quarter or third; corolla bright yellow, lobes deltoid-acuminate, 2-3 mm. long 5. *A. borii* Airy Shaw
- Leaves smooth and shining above, often entire or toothed near the extreme apex only; corolla some shade of red, or green, lobes long and narrow, about 8 mm. long:
- Leaves broadly oblanceolate to very broadly obovate, 2.5-5 cm. long, 1-2.5 cm. broad; stems flexuous, creeping, terete or less strongly angled
4. *A. pyrolifolia* Airy Shaw
- Leaves rather narrowly oblanceolate, 3-4 cm. long, 1-1.3 cm. broad; stems rigid, erect, strongly and sharply angled 3. *A. interdicta* Hand.-Mazz.
- Corolla shortly conical-cylindric, 1-2 cm. long; calyx 5-7 mm. long:
- Leaves 4-7.5 cm. long, lanceolate-elliptic; young branches glabrous or minutely puberulous, but not hispid-setulose; calyx-segments broad and rounded, sometimes minutely apiculate 6. *A. listeri* (King ex C. B. Clarke) Sleumer
- Leaves 1-3.5 cm. long, obovate or elliptic-obovate; young branches more or less hispid-setulose; sepals ovate or lanceolate, acuminate:
- Leaves somewhat bullate, with a distinct pair of marginal hydathodes near the base; nerves distinct and impressed above; denticulation usually distinct
7. *A. smithiana* Sleumer
- Leaves flat, without basal hydathodes; nerves immersed and very obscure above; margin almost entire, except at apex 8. *A. kingdonis* Airy Shaw

SUBSERIES BULLATAE

2. *Agapetes incurvata* (Griff.) Sleumer in Engl. Bot. Jahrb. 70, 105 (1939); Airy Shaw in Kew Bull. 1948, 99 (1948).

Further study of this species and *A. hookeri* (C. B. Cl.) Sleumer has convinced me that they must be treated as forms of one variable species. As the variation seems to show some degree of geographical correlation, I propose to recognise two 'varieties', an eastern and a western, distinguished mainly upon length of pedicel, with certain associated, but less constant, characters. Clarke made no mention of the difference in pedicel length, and in fact gave no measurements at all for his *Pentapterygium hookeri*. The distinctions may be set out as follows.

Pedicelli 1.6-2.7 cm. longi (sub fructu etiam usque 3 cm. longi); inflorescentia plerumque glaberrima, sed pedicellis interdum puberulis; corolla rubra vel rosea vel alba, transverse sanguineo-lineata (Bhutan, Assam) var. *incurvata*

Pedicelli 0.9-1.6 cm. longi; inflorescentia plerumque puberula, raro glabra; corolla plerumque laete lutea (alabastro viridula), rarius 'purpureo-rubra' (Sikkim)

var. *hookeri* (C. B. Cl.) Airy Shaw

var. *incurvata*.

Gaylussacia incurvata Griff. Ic. Pl. Asiat. t. 506 (1854).

Vaccinium rugosum Hook. f. et Thoms. ex Hook. Bot. Mag. 82, sub t. 4910 (1856).

I would refer here all material from ASSAM and BHUTAN, including Griffith 445 (Kew distrib. no. 3464) from Bailfa, Bhutan, previously cited by me (1948, 99) under *Agapetes hookeri*.

Additional material:

ASSAM. Manda La, Dirang Dzong, 2400 m., 6 July 1938, *F. Kingdon Ward* 13848 (Herb. Mus. Brit.). 'A small epiphytic shrub in *Tsuga-Rhododendron* forest. Anthers prolonged into covering points.' Khasi Hills: Mawphlang, in thickets on wet cliffs, usually in lumps of moss, 1200-1350 m., 11 Aug. 1949, *F. Kingdon Ward* 18761 (Herb. New York B.G.): 'A small leggy shrub. Flowers crimson with zigzag marking. Youngest shoots pilose, otherwise quite glabrous.'

Ward 13848 is a plant with puberulous pedicels. The collector failed to note the colour of the corollas, though the transverse banding is clearly visible in the dried material.

var. **hookeri** (C. B. Clarke) Airy Shaw, stat. nov.

Pentapterygium hookeri C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* **3**, 450 (1882); Cowan & Cowan, *Trees N. Bengal*, 80 (1929).

Agapetes hookeri (C. B. Cl.) Sleumer in Engl. *Bot. Jahrb.* **70**, 106 (1939); Airy Shaw in *Kew Bull.* **1948**, 98 (1948).

To this variety I now refer all SIKKIM material, including *Treutler* '971?', previously cited by me (1948, 99, 100) under *A. incurvata*.

The following recently collected specimen must for the present be left as *Agapetes incurvata* (Griff.) Sleumer, *sensu lato*. It has the long pedicels of var. *incurvata*, but these are strongly puberulous, and the indumentum even extends (more sparsely) to the lower part of the calyx (receptacle). I have seen no other specimen with this latter feature. The specimen is unfortunately in bud, and the colour of the mature corolla is therefore in doubt. The locality moreover represents an extension of range of the species. Until further collections become available, a more precise determination is not possible.

E. NEPAL. Arun valley, Chhoyang Khola, W. of Num, climbing on tree in forest, 2550 m., 18 June 1956, *J. D. A. Stainton* 707 (Herb. Mus. Brit.): 'Corolla? reddish green.'

SUBSERIES PLANIFOLIAE

3. ***Agapetes interdicta*** (Hand.-Mazz.) Sleumer in Engler, *Bot. Jahrb.* **70**, 106 (1939); Airy Shaw in *Kew Bull.* **1948**, 100 (1948), *q.v.*

Additional material:—

ASSAM. Mishmi Hills: Delei valley, temperate evergreen forest, 2400 m., 15 Dec. 1933, *F. Kingdon Ward* 11047 (Herb. Mus. Brit.): 'An epiphyte. Leaves entire, upper surface smooth. Flowers not quite open.'

BURMA. Burma-Tibet frontier: hills E. of the Nam Tisang, 1500–1800 m., 5 Jan. 1931, *F. Kingdon Ward* 9100 (Herb. Mus. Brit.): 'Epiphyte in the forest. Flowers crimson tipped with green.' Kachin State: North Triangle (Hkinlum), in temperate forest, 2250 m., 22 April 1953, *F. Kingdon Ward* 20713 (Herb. Mus. Brit.): 'An epiphytic shrub. Flowers few, crimson with broad green band at apex.' North Triangle (Uring Bum, above Ahkail), 2100 m., 13 May 1953, *F. Kingdon Ward* 20832 (Herb. Mus. Brit.): 'A bushy undershrub, epiphytic in the forest. Whole plant glabrous. Corolla fallen. Calyx and ovary red.'

Agapetes interdicta is evidently a rather common species in the area represented, being now known from upwards of a dozen collections. It exhibits considerable variation, both in foliage and in floral characters, and one form has already received a name [var. *stenoloba* (W. E. Evans) Sleumer]; but there seems to be little if any character-correlation, either morphologically or geographically. Its erect bushy habit, with strict, rigid, strongly angled branchlets, immediately distinguishes it from the two following closely related species.

The corolla was unknown at the time of description (cf. W. E. Evans in *Notes Roy. Bot. Gard. Edinb.* **15**, 207-8: 1927), and has remained so ever since. A description is now supplied.

Corolla cylindrica, 2.7-3.4 cm. longa (lobis inclusis), 7-8 mm. diametro, glabra, kermesina vel miniata, lobis anguste triangulari-subulatis 8-9 mm. longis recurvis viridibus. *Filamenta* 4-5 mm. longa, 1 mm. lata, glabra. *Antherae* 3.1 cm. longae: thecae anguste oblongae, c. 1 cm. longae, basi in caudam communem brevem (1.5 mm.) desinentes, cauda ipsa apice ancoriformiter bifurcata asperato-papillosa; rostra 2.1 cm. longa, recta, glabra, dorso ecalcarata. *Stylus* filiformis, usque 3.4 cm. longus, glaber, stigmatе minuto.

4. ***Agapetes pyrolifolia*** *Airy Shaw*, sp. nov., *A. interdictae* (Hand.-Mazz.) Sleumer peraffinis, sed habitu plus minusve repente (nec stricte fruticuloso), caulibus teretibus vel obscurissime angulatis minus dense foliatis, foliis majoribus et pro rata latoribus oblanceolatis usque latissime obovatis, usque 5 cm. longis et 2.5 cm. latis, satis distincta.—*A. interdicta* et var. *stenoloba* sec. *Airy Shaw* in *Kew Bull.* **1948**, 100 (1948), *pro parte*.

Suffrutex epiphyticus. *Caules* ut videtur basi repentes, inde adscendentes, flexuosi, 1.5-3 mm. crassi, teretes vel obscure et obtuse angulati, glabri (innovationibus tamen primum puberulis), cortice pallido. *Folia* latiuscule oblanceolata usque latissime obovata, 2.5-5 cm. longa, 1-2.5 cm. lata, basi cuneata, dein interdum in petiolum abruptiuscule angustata, apice acuta usque rotundata (tunc interdum fere erosa), margine integra vel prope apicem serraturis parvis paucis praedita (denticulis acutis), plana vel leviter revoluta, glaberrima, supra siccitate subnitida, brunnescentia, costa argute prominente, nervis lateralibus vel obscuris vel leviter impressis vel distincte reticulato-elevatis, subtus siccitate obscura, viridula, costa nervisque prominulis reticulatis; petiolus 1 mm. longus, fere 2 mm. crassus, glaber. *Inflorescentia* 1-2-flora: pedunculus 2-6 mm. longus, puberulus, bracteis bracteolisque minutis triangularibus brunneis; pedicelli 7-11 mm. longi, puberuli, raro fere glabri. *Calyx* totus 1.3-1.8 vel etiam 2.2 cm. longus, ab eo *A. interdictae* vix distinguendus, inferne 5-alatus, retusus; receptaculum 4 mm. longum; segmenta oblonga usque ovata, 9-13 mm. longa, 4-6 mm. lata, acuminato-acuta, membranacea, miniata, glabra. *Corolla* 2.3-2.9 cm. longa, sursum sensim ampliata, 5-8 mm. diametro, glabra, miniata, transverse kermesino-vittata, lobis elongato-triangularibus 8 mm. longis acuminatis recurvis pallide viridibus. *Filamenta* 3-4 mm. longa, 0.8 mm. lata, papilloso-puberula. *Antherae* c. 2.8 cm. longae: thecae anguste oblongae, circiter 6 mm. longae, basi in caudam communem brevem (1.5 mm.) desinentes, cauda ipsa sub apicem ancoriformiter biappendiculata asperato-papillosa; rostra c. 2.2 cm. longa, recta, glabra, dorso ecalcarata. *Stylus* filiformis, circiter 2.9 cm. longus, glaber, stigmatе minuto. *Fructus* (immaturus) 9 mm. diametro.

BURMA-TIBET FRONTIER. Taron valley, 2400 m., 31 Oct. 1922, *F. Kingdon Ward* 5477 (Herb. Edin.): 'Epiphyte in the lower forest, with *Agapetes*, *Aeschynanthus*, etc. Perianth lobes pale green.' Base Camp, Seinghku Wang, in the tanglewood forest, 1800 m., 28 May 1926, *F. Kingdon Ward* 6784 (typus, Herb. Kew.): 'Epiphytic. Calyx and corolla scarlet, the latter with pale green recurved teeth. When the corolla has fallen the huge red calyx

tube looks like another flower!' Valley of the Seinghku, 28° 5' N., 97° 30' E., in the upper rain forest, on big oak trees, etc., 2400–2700 m., 25 Sept. 1926, *F. Kingdon Ward* 7457 (Herb. Kew.): 'Epiphytic. Flowers over, but some in bud. Calyx green, in fruit becoming flushed red.'

Although this species is obviously closely related to *A. interdicta*, the flexuous, trailing, terete stems, combined with the much larger and broader leaves, contrast strongly with the erect, bushy habit, sharply angled stems and small oblanceolate leaves of the former species. There appears to be little, if any, difference in the floral characters.

5. ***Agapetes borii*** *Airy Shaw* in *Kew Bull.* **1948**, 101 (1948), *var.*, vel sp. aff.

ASSAM. Naga Hills: Saramati ridge, 5 miles [8 km.] south of the peak, 2100–2400 m., 11 March 1935, *F. Kingdon Ward* 11162 (Herb. Mus. Brit.): 'An epiphyte with greenish yellow flowers. Very common along the ridge, in the temperate rain forest.'

This is a puzzling plant. In many ways it is intermediate between *A. borii* and *A. listeri*. The leaves have the shiny upper surface and conspicuous venation of *listeri*, rather than the dull, matt surface of *borii*; but the calyx-segments are almost exactly intermediate between the short, rounded ones of *listeri* and the more elongate lanceolate ones of *borii*, while the corolla is, as in *borii*, about 2.5 cm. long and widened upwards to within a short distance of the mouth, i.e. subclavate-cylindric, instead of the shortly urceolate-cylindric type of *listeri*. On balance, therefore, I feel that it is perhaps nearer to *borii*; but a more satisfactory pronouncement as to its status must await the receipt of further material.

Since writing the above, I have been informed by Dr. Bor that the above-cited specimen, *K.W.* 11162, actually formed part of the same gathering as *Bor* 2913, upon which *Agapetes borii* was based. This would suggest, either that *A. listeri* is in itself a very variable species, in which *A. borii* must be included; or else that it is being strongly affected by introgression from some other species at present unknown, in which case *A. borii* is of hybrid origin. The need for further material becomes the more urgent.

6. ***Agapetes listeri*** (*King ex C. B. Clarke*) *Sleumer* in *Engler, Bot. Jahrb.* **70**, 105 (1939); *Airy Shaw* in *Kew Bull.* **1948**, 101 (1948).

Pentapterygium listeri C. B. Clarke in *Hook. fil. Fl. Brit. Ind.* **3**, 450 (1882).

Additional material:

ASSAM. Balipara Frontier Tract: Pankim La, 2400–2700 m., 3 May 1935, *F. Kingdon Ward* 11380 (Herb. Mus. Brit.): 'A common epiphyte of the upper temperate rain forest.' Sirhoi, on trees in forest, 2100 m., 26 Oct. 1948, *F. Kingdon Ward* 18266 (Herb. New York B.G.): 'An epiphytic under-shrub. Flowers in bud, yellow.'

Ward 11380 is the first specimen of *A. listeri* to be collected with mature expanded corollas. This shows them to be distinctly urceolate-cylindric, 1.4–1.5 cm. long, 8–9 mm. in diameter in the widest part (as pressed) and 6 mm. in diameter at the mouth, with shortly ovate-triangular lobes. The calyx-segments (free part) are small, suborbicular, 3 mm. in diameter. The collector omitted, in this case, to note the colour of the corolla; but, from the fact that he wrote '*Pentapterygium flavum*' on the field label, there can be little

doubt that it was yellow. C. B. Clarke's statement (*l.c.*) that the corolla was 'rose red' is curious. No such information appears on the labels of either of the only two specimens (*Lister* and *Booth*) available to him. On the *Lister* specimen he has noted that 'Dr. King altered the name to this at Kew'—*i.e.* from a manuscript name under *Vaccinium* to *Pentapterygium listeri*—and it is therefore just possible that he may then have given him some verbal information as to the flower colour; but I suspect that it was an error.

7. **Agapetes smithiana** Sleumer in Engler, *Bot. Jahrb.* **70**, 106 (1939); Airy Shaw in *Kew Bull.* **1948**, 101 (1948).

Pentapterygium sikkimense W. W. Smith in *Rec. Bot. Surv. India*, **4**, 268 (1911); Cowan & Cowan, *Trees N. Bengal*, 80 (1929); nec *Agapetes sikkimensis* Airy Shaw 1935.

var. **major** Airy Shaw, var. nov., corolla fere duplo majore cylindrica 1·7–2·1 cm. longa 7–9 mm. diametro (explanata).

BHUTAN. Pimi Rudo La, 2550 m., found under trees in the rain forest on which it had apparently been growing as an epiphyte, 16 April 1949, *Ludlow, Sherriff & Hicks* 20114 (Herb. Mus. Brit.): 'Corolla yellow'.

A. smithiana has hitherto been known only from Sikkim, where it has been collected some half-dozen times (*vide* Airy Shaw, *l.c. supra*). The present Bhutan gathering thus represents an extension of range. Since all the Sikkim specimens agree in having flowers about 1 cm. long, it seems justifiable, taken in conjunction with the geography, to give this large-flowered plant a distinctive name. The pair of marginal hydathodes a short distance above the base of the lamina (present in most of the larger-leaved *Pteryganthae*, as well as in *smithiana*) is unusually conspicuous in this specimen. It appears to differ in no other essential particular.

It may be mentioned that a coloured drawing of a plant of *A. smithiana* that flowered at Kew in 1918 is preserved in the Kew Herbarium. The plant was received from the late H. J. Elwes, who had obtained it at Hooker's Camp, Zemu Bridge, Sikkim, in 1886.

The type specimen (*Gammie* 1216) shows considerably larger leaves (2·2–3·5 × 1·3–1·8 cm., as against 1·4–2·8 × 0·8–1·4 cm.) than the remaining collections (including the present one from Bhutan), and other collections show other differences of leaf-shape or texture. Some of these may prove to be significant when further material becomes available.

8. **Agapetes kingdonis** Airy Shaw, sp. nov., primo adspectu *A. smithianae* Sleumer simillima, sed habitu laxiore, caule longius repente, foliis subintegris imo apice tantum denticulatis hydathodiis binis subbasalibus omnino carentibus, nervatione (costa excepta) supra valde obscura immersa (nec subbullato-impressa) subtus obscure reticulata satis distincta.

Suffrutex parvus, epiphyticus. *Caules* elongati, flexuosi, graciles, longe vagantes, 0·5–2 mm. crassi, perlaxe foliati. *Folia* obovata vel breviter oblanceolata, 1·1–2·2 cm. longa, 0·8–1·1 cm. lata, basi cuneato-angustata, apice subacuta, brevissime apiculata, subintegra, tantum prope imum apicem paucidenticulata denticulis inconspicuis incurvis, rigide coriacea, costa supra argute prominente, nervis lateralibus fere omnino immersis, costa nervisque subtus levissime prominulis, siccitate supra obscure plumbea

subtus obscure brunnescentia, petiolo vix 1 mm. longo. *Flores* solitarii usque terni; pedunculo subnullo, bracteolis minutis, pedicello gracili 8–10 mm. longo minute puberulo et insuper dissite breviter glanduloso-setuloso. *Receptaculum* obconicum, 2–2.5 mm. longum, quinque-alatum, alis basi breviter productis, glabrum. *Sepala* lanceolata, circiter 7 mm. longa, 2.5 mm. lata, acute acuminata, submembranacea, glabra, nervis manifestis. *Corolla* cylindrica, alabastro fere maturo tota 1.2–1.3 cm. longa, 3–5 mm. diametro, quinque-angulata, flava, sursum levissime angustata, dein sub apicem in rostrum breve abrupte contracta, glabra, lobis subulatis acutis 2.5 mm. longis. *Stamina* 11–12 mm. longa: filamenta 1.5 mm. longa; thecae 3 mm. longae, papillosae; rostra 7–8 mm. longa, gracilia, recta, dorso ecalcarata. *Stylus* 12–13 mm. longus, glaber. *Fructus* subglobosus, 6–8 mm. diametro, calycis segmentis coronatus.

BURMA. Nam Tamai valley, 27° 45' N., 97° 45' E., 1800–2400 m., 16 Nov. 1937, *F. Kingdon Ward* 13462 (Herb. Mus. Brit.): 'A straggling epiphytic shrub, with small entire leaves. Glabrous except for the pilose pedicels. Flowers yellow, solitary or in 3-flowered fascicles. Anthers simple, without processes.—This is not *P[entapterygium] flavum* or *P. hookeri*, so it may be new.'

I have named this species after the collector, in recognition of his suspicion that it might prove to be new. It forms a fourth member of what may be called the 'interdicta' group, being closest to *A. smithiana*, from which it differs in its flat, not bullate, leaves, completely lacking the characteristic basal pair of hydathodes so noticeable in that species, with nerves completely immersed and invisible on the upper surface. The habit appears to be more loosely trailing, with the leaves more scattered along the stems, and the young shoots are less setulose.

SERIES GRACILES

This series is now enlarged by the description of four new species, and by the transference to it of two from the *Longifoliae* and two from the *Pteryganthae*. All the known species have dorsally ecalcarate anthers. Tendencies observable in the series include: long narrow leaves ('*Desmogyne*' group), and elongate slender peduncles and/or pedicels, although in the '*Desmogyne*' group they are often thickened and fleshy. There is very little development of glandular indumentum, except in the '*serpens*' group.

For the present I am recognising only two subseries, but it is very probable that the discovery of further species will make further subdivision necessary.

Subseries **Longifoliae** *Airy Shaw*. Folia elongata, oblongo-lanceolata usque anguste linearia, 6 cm. longitudinis excedentia. (*Desmogyne* King et Prain.)—Typus: *A. linearifolia* C. B. Clarke.

Subseries **Parvifoliae** *Airy Shaw*. Folia parva vel minima, ovata vel elliptica vel suborbicularia, 6 cm. longitudinis haud attingentia.—Typus: *A. praeclara* Marq.

(For key to species included in Subser. *Longifoliae*, see *K.B.* 1935, 38; for key to Subser. *Parvifoliae*, see below, p. 492).

SUBSERIES LONGIFOLIAE

1. **Agapetes neriifolia** (King et Prain) Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 39 (1935).

Desmogyne neriifolia King et Prain in *Journ. As. Soc. Beng.* 67 (2), 297 (1898).

Additional material:

UPPER BURMA. Kachin State: The Triangle, Sumpra Bum, 1200 m., 18 Jan. 1953, *F. Kingdon Ward* 20403 (Herb. Mus. Brit.): 'A lax epiphytic undershrub, the long branches weighted down with pendent branches of flowers. Commonly seen high up in big trees. Leaves tough and leathery, margins incurved. Ovary and calyx crimson, a green band round base of latter; inflorescence more or less mealy, especially within the calyx.'

Only fruiting material is represented.

var. **maxima** Airy Shaw, var. nov., calyce (jam tempore florendi) usque 2.3 cm. lato valde nervoso, corolla 4.5 cm. longa et 1.5 cm. diametro.

BURMA. Bhamo district: Sinlum Res., 1440 m., 6 March 1927, *Law Maung Mya* 4972 (Herb. Kew.): 'Woody epiphyte forming small shrub on *Quercus* tree. It has tuber. Roots penetrate into the tree to a small extent. Flowers pinkish (from old wood or twig)'.

Distinguished by the unusually large, wide, apparently slightly fleshy corolla.

var. **minor** (King et Gamble) Airy Shaw, stat. nov.; foliis 6–10 cm. tantum longis, inflorescentiis interdum multifloris, pedicellis plerumque gracilioribus usque 6 cm. longis, corolla 2–2.5 cm. tantum longa, differt.—*Desmogyne minor* King et Prain in *Ann. Roy. Bot. Gard. Calcutta*, 9 (1), 47 (1901), in obs.; Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 40 (1935), in obs.

UPPER BURMA. Kachin State: North Triangle (Hkinlum), 1200 m., 31 Aug. 1953, *F. Kingdon Ward* 21302 (Herb. Mus. Brit.): 'An epiphytic undershrub of bushy habit, growing on big forest trees. In bud. Leaves with caudate-acuminate apex. Flowers crimson?' *Ibid.*, 1200 m., 14 Sept. 1953, *F. Kingdon Ward* 21330 (Herb. Mus. Brit.): 'No. 21302 in bloom. The very large cup-like calyx is flesh pink; corolla pink at the base, becoming green at the teeth, with dark lines at the angles. This species is not rare, but generally high up in the largest trees.'

The information given with the original publication of the name *Desmogyne minor* was very meagre and somewhat indefinite: 'A second species or variety, *Desmogyne minor*, very similar to *D. neriifolia* but much smaller in all its parts, was obtained by Mr. Wallace, during the Railway Survey Expedition through the Hukung Valley.' So far as it goes, however, it is very applicable to the present two collections of Kingdon Ward, and, pending actual inspection of the type material, I feel justified in treating these specimens as referable to the same taxon.

3. **Agapetes griffithii** C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 449 (1882); Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 40, 41 (1935), in obs.

ASSAM. Nullah, in humidis, 1500–1650 m., 15th (?), 1837, *Griffith*: 'Ceratostema? Ped. virides, clavati.'

Little can be added to the few remarks already made on this species (*l.c. supra*); complete flowering material is greatly needed. It may be emphasized that Clarke's description of the leaves as 'coriaceous' is somewhat misleading: they are at most thinly coriaceous, or better chartaceous. Although I included this species in my key (*l.c.* 38) under the heading 'Calyx-limb divided to base', the flowers are in fact in such very young bud that it is scarcely possible to make a categorical statement on this point.

5. **Agapetes nutans** Dunn in *Bull. Misc. Inf.*, Kew, **1920**, 134 (1920); Burkill in *Rec. Bot. Surv. Ind.* **10**, 52, 74, 311 (1924-25).

ASSAM. Outer Abor Hills: 'An epiphyte of the high forest, found on a razor edge between the Serpo and Lalik streams at 1530 m.; flowering in January, the bells crimson with green-tipped lobes,' 1912, *I. H. Burkill* 36347.

No further material of this distinct species is known to me. To Dunn's description, it may be added that the leaves sometimes show traces of very shallow, remote undulate-denticulation towards the apex; the inflorescence is a long-peduncled, 5-6-flowered corymb, rather than raceme; the pedicels, unlike the peduncle (and bracteoles!), are quite glabrous; and the anthers are dorsally ecalcarate.

Burkill (*l.c.* 311) notes that this species was growing in association with *A. marginata* Dunn (*supra*, p. 471).

7. **Agapetes angustifolia** (Knagg) Airy Shaw in *Bull. Misc. Inf.*, Kew, **1935**, 40 (1935), *in obs.*

Desmogne angustifolia Knagg in *Notes Roy. Bot. Gard. Edinb.* **14**, 73 (1923).

forma **latifolia** Airy Shaw, f. nov., foliis latoribus (fere ut in *A. pseudo-griffithii* A.S.) 2-3 cm. latis.—*A. pseudo-griffithii* var. *filipes* A.S. in *Kew Bull.* **1948**, 92 (1948).

BURMA. Hills east of Putao, 27° N., 97° E., 300-600 m., 10 Dec. 1937, *F. Kingdon Ward* 13573 (Herb. Mus. Brit.): 'A common epiphyte in the forest, on the exposed western slopes of the range. In bud.'

Many more collections will be needed in order to clarify the status of the forms in this '*Desmogyne*' group. I now feel (as indicated originally, *K.B.* **1948**, 92) that this form with slender inflorescence and small slender flowers should be referred to *A. angustifolia*, in spite of its broad leaves so strongly resembling those of *A. pseudo-griffithii*. I have reduced the status to that of 'forma' in order to obviate the necessity of taking up the epithet *filipes*, which would be meaningless under the present species.

The type-specimen of *A. angustifolia* was collected by Kingdon Ward (no. 5566) at Nam Yin, headwaters of the Irrawaddy, in 1922. This type form (*i.e.* f. *angustifolia*) is otherwise unknown.

SUBSERIES PARVIFOLIAE

Revised Key to species.

Leaves less than 6 cm. long:

Leaves acuminate or subacuminate, 2-5 cm. long:

Pedicels with distinct cupular expansion at apex:

Calyx-limb widely cup-shaped, membranous, divided to about three-fourths into triangular segments 6 mm. long; corolla divided almost to base into linear segments; inflorescence up to 8-flowered 8. **A. discolor** C. B. Clarke

- Calyx-segments narrowly subulate, erect, 4 mm. long, addressed to the corolla; corolla-lobes short, triangular, acuminate, 3-4 mm. long; inflorescence up to 13-flowered 9. *A. atosanguinea* Airy Shaw
- Pedicels not or scarcely cupuliform-expanded at apex; calyx divided almost to the base into short deltoid segments scarcely 2 mm. long; corolla-lobes short, deltoid, about 1 mm. long; inflorescence 4-5-flowered 10. *A. forrestii* W. E. Evans
- Leaves rounded or acute, but not acuminate:
- Leaves mostly 2-4 cm. long 15. *A. buxifolia* Nutt.
- Leaves less than 2 cm. long:
- Inflorescence a very slender 2-flowered corymb: peduncle and pedicels subequal, together up to 4.5 cm. long; calyx-segments lanceolate, about 3 mm. long; corolla nearly 2.5 cm. long; leaves 1-2 × 0.5-1.2 cm., with a few (3-4) distant distinct teeth 14. *A. mitrarioides* Hook. fil.
- Inflorescence subfasciculate, 2-3-flowered (up to 8-flowered in *A. praestigiosa* A.S.), or flowers solitary, peduncle obsolete or up to 4 mm. long:
- Corolla-lobes narrow-linear, elongate, sharply reflexed at anthesis; flowers solitary, pedicel filiform; leaves thinly chartaceous, crenulate 14. *A. refracta* Airy Shaw
- Corolla-lobes not as above; leaves mostly coriaceous:
- Venation on upper surface of mature leaves entirely immersed and invisible, or at most very obscure; epidermis usually transversely wrinkled on drying; corolla cylindric, 2-3 cm. long; pedicel and receptacle often glandular-setose:
- Receptacle obconic, unwinged; corolla-lobes large, triangular, 6-7 mm. long 16. *A. lacei* Craib
- Receptacle obovoid, 5-winged; corolla-lobes small, deltoid, 2-3 mm. long 17. *A. serpens* (Wight) Sleumer
- Venation on upper surface of mature leaves deeply reticulately impressed, not transversely wrinkled:
- Corolla cylindric, unwinged, 1.5-1.7 cm. long; pedicels glabrous 11. *A. praeclara* Marquand
- Corolla shortly urceolate or conical, strongly angled or winged, 5-8 mm. long:
- Leaves ovate to lanceolate, 1.5-2.2 cm. long; inflorescences from subapical leaf-axils, 3-8-flowered, glabrous; pedicels rather stout 12. *A. praestigiosa* Airy Shaw
- Leaves broadly elliptic or ovate to suborbicular, 0.6-1.4 cm. long; inflorescences produced all along the branches, 1-2-flowered, finely glandular-setose; pedicels very slender:
- Leaves larger, 8-14 mm. long, claret-coloured and sparsely setulose below; receptacle 5-winged, puberulous; calyx-segments triangular-deltoid, entire; corolla 5 mm. wide 18. *A. subvinacea* Airy Shaw
- Leaves smaller, 6-7 mm. long, pallid-brownish and glabrous below; receptacle unwinged, glabrous; corolla about 7 mm. wide 19. *A. miranda* Airy Shaw

8. *Agapetes discolor* C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 448 (1881); Brandis, *Ind. Trees*, 405 (1906); Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 39 (1935), in clavi.

Additional material:

ASSAM: Khasia Hills, Churdwar, in fruit, no date, *Simons* (Herb. Lugd.-Bat., Herb. Bogor.). Jamiri, 1200-1500 m., 25 Oct. 1935, *F. Kingdon Ward* 12472 (Herb. Mus. Brit.): 'An epiphytic shrub.'

This rather curious species is notable for the large, widely spreading, membranous calyx, and the rather short corolla, deeply divided into linear segments, which are strongly revolute at anthesis, the tube at the same time becoming broad and campanulate. The corolla (but not the calyx) is comparable with that of *A. bracteata* Hook. f. and *A. lobbii* C. B. Clarke. In *Simons's* Churdwar gathering, which is in fruit, the pedicels are strict, and the apical cupular expansion is unusually large (3.5 mm. diam.) and almost hemispherical.

Since only one of the three early collections (*Griffith, Booth and King*) upon which Clarke based the species, is in flower, I designate this as LECTOTYPE: Assam, Daphla Hills, 2 Nov. 1849, *Booth* (for Nuttall) (Herb. Kew.). Clarke's attribution of the Daphla Hills to 'Bhutan' was erroneous, as was his attribution of King's locality, 'Teniv Lampa', to the 'Sikkim Himalaya'; the latter locality is also in the Daphla Hills, which are in Assam.

Ward's specimen was in full flower on October 25. Booth's specimen was flowering on November 2; King's (from 1050 m. altitude) was in fruit on December 19; Griffith's collection (from Namyoom in the Patkoy Hills) was apparently made on March 2, and was likewise in fruit. I write 'apparently', since the date on the label looks like '2nd Fy', or even '2nd Jy': but according to his own journals (*Griff. Priv. Journ. Trav.* 64, 65: 1847) Griffith was at this locality early in March.

9. ***Agapetes atrosanguinea*** *Airy Shaw*, sp. nov., quoad folia ab *A. discolori* C. B. Cl. vix distinguenda, sed receptaculo parvo, calycis segmentis parvis subulatis erectis, corollae cylindricae atrosanguineae lobis brevibus triangularibus toto caelo abhorret.

Frutex epiphyticus, ramis elongatis parcissime foliatis vel nudis densiuscule puberulis 2 mm. crassis. *Folia* (in ramulis hornotinis tantum suppetentia) ovato-lanceolata, 3-4 cm. longa, 1.4-1.5 cm. lata, basi subrotundata in petiolum subito cuneato-angustata, apice sensim acuminato-attenuata, acumine acutissimo, margine remote crenato denticulata denticulis utrinque 4-5 incurvis, chartacea, glabra, siccitate utrinque viridia, costa nervisque laxis supra impressis subtus prominulis, petiolo gracili 2 mm. longo. *Inflorescentiae* e ramo nudo vetustiore ortae, corymbiformes, 7-13-florae, glaberrimae (vel rhachi interdum minutissime puberula?). *Pedunculus* gracilis, 6-7 mm. longus; axis (pars pedunculi florifera) 3-6 mm. longa. *Pedicelli* graciles, 1.5-1.7 cm. longi, basi bracteolis minutis subulatis brunneis suffulti, superne leviter ampliati, apice in cupulam parvam distinctam apertam fore 2 mm. diametro subito expansi. *Receptaculum* parvum, oblongum, 1-1.5 mm. longum et latum, basi distincte stipitatum, glabrum. *Calycis* segmenta anguste subulata, 4 mm. longa, basi brevissime connata, 1 mm. lata, acuminata, acutissima, longitudinaliter nervosa, glabra, erecta, corollae adpressa. *Corolla* cylindrica, 1.7-1.9 cm. longa, sursum levissime ampliata, alabastro 3 mm. sub anthesi 4-7 mm. diametro, 5-angulata, ut videtur atro-sanguinea, angulis pallidioribus, breviter lobata, lobis triangularibus 3-4 mm. longis acuminatis reflexis, glabra. *Stamina* 1.6 cm. longa: filamenta brevissima, 1 mm. longa, glabra; thecae oblongae, 5 mm. longae, basi in caudam brevissimam angustatae; rostra elongata, recta, 10-11 mm. longa, ecalcarata. *Stylus* 1.2 cm. longus, glaber, stigmate minuto truncato. *Fructus* ignotus.

N.W. ASSAM. Apa Tani valley, 93° 50' E., 27° 30' N., in light forest, 1800 m., 21 Nov. 1955, *N. Rankin* & *S. Pretzlik* 162 (Herb. Mus. Brit.): 'Tree orchid [*sic*], growing on *Ficus*.'

In foliage (but only 5½ leaves are available) this species appears to be indistinguishable from *A. discolor*. The flowers, however, are utterly different, being of a type much more 'normal' in the genus. The narrow, stipitate receptacle, and (to judge from the dried material, without field notes) the very dark crimson corolla, are noteworthy features.

Agapetes sp. nov. ? peraff. *A. discolori* C. B. Cl. et *A. atosanguineae* A.S.

ASSAM. Tembang, Assam Himalaya, 2100–2400 m., 15 May 1938, *F. Kingdon Ward* 13643 (Herb. Mus. Brit.): 'A common epiphyte in sheltered forest (largely deciduous). In fruit.'

This fruiting specimen is, again, as to foliage, indistinguishable from *A. discolor* and *A. atosanguinea*. The fruiting calyces show that it is not *A. discolor*. It is just possible that it might be referable to *A. atosanguinea*, but I suspect that a further new species is represented. The inflorescences, instead of being borne on the old wood, as in *atosanguinea*, arise from subterminal leaf-axils, and are only 3-flowered; whilst the apical cupuliform expansion of the pedicels is considerably larger than in the species mentioned, even allowing for the enlargement to be expected in the fruiting stage. The calyx segments are narrowly subulate as in *atosanguinea*.

11. **Agapetes praeclara** Marq. in *Journ. Linn. Soc., Bot.*, **48**, 197 (1929); Airy Shaw in *Bull. Misc. Inf.*, Kew, **1935**, 44 (1935).

Additional material:

S.E. TIBET. Tsakchugong, lower Po Tsangpo valley, Pome, 2100 m., 27 Feb. 1947, *Ludlow, Sherriff & Elliott* 12262 (Herb. Mus. Brit.): 'Shrub, epiphytic, 2–4 ft. Flowers deep red, tipped green.'

This agrees closely with the type specimen (*Kingdon Ward* 6323), which was also collected in the Tsangpo valley.

12. **Agapetes praestigiosa** Airy Shaw, sp. nov., quoad folia ab *A. praeclara* Marq. vix distinguenda, sed corolla brevi 'vaccinioidea' plane aliena.

Suffrutex epiphyticus, ramis longis pendulis flexuosis dense fusco-setosis crebre foliatis. *Folia* ovata usque elliptica, 1.5–2.2 cm. longa, 0.6–1.1 cm. lata, basi rotundata usque late cuneata, apice abrupte vel sensim angustata, fere pungenti-apiculata, margine leviter sed distincte serrulato-denticulata, valde revoluta, rigide coriacea, utrinque glaberrima, siccitate supra pallide cinereo-viridula, subtus lutescentia, costa nervisque supra valde et pulcherrime reticulato-insculptis (costa insuper in canaliculo anguste prominula) subtus obscure elevatis, petiolo 1 mm. longo. *Inflorescentiae* subfasciculatae, ex axillis superioribus (vel e ramis annotinis, teste collectore) ortae, ut videtur 3–8-florae, pedicellis 8–10 mm. longis glabris. *Receptaculum* turbina-tum, 2 mm. diametro, glabrum. *Calycis* segmenta deltoidea, vix vel brevissime connata, 1.5–2 mm. longa, acuta, glabra, nervo medio prominente. *Corolla* parva, globoso-urceolata, 5–7 mm. longa, acute quinque-angulata, glabra, cerasicolor, lobis minimis deltoideis 0.5 mm. longis erectis. *Filamenta* brevissima, vix 0.5 mm. longa, glabra. *Antherae* 4 mm. longae: thecae oblongae, 2 mm. longae, basi in caudam brevem 0.5 mm. longam productae; rostra tubulosa, 2 mm. longa, leviter sigmoidea, ecalcarata. *Stylus* filiformis, 4 mm. longus, glaber, stigmate punctiformi. *Fructus* (? immaturus) globosus, 3–5 mm. diametro, glaber, calyce erecto coronatus.

ASSAM. Tembang, Assam Himalaya, 2100–2400 m., 14 May 1938, *F. Kingdon Ward* 13641 (Herb. Mus. Brit.): 'A lax epiphytic shrub, with long drooping flexuous branches, which are closely beset with bristles. Leaves small (under 1 in.), coriaceous, bullate, almost sessile, narrow oval acuminate, finely serrate. Flowers in fascicles, axillary or on older wood. Corolla cherry

red, with minute teeth, subglobular, 5-angled. Anthers not spurred. Pedicel $\frac{1}{4}$ in. A common epiphyte in the dry forest belt above 2100 m. Covered with moss. Tuberous water-storing swellings are produced. Apparently a new species.'

The epithet chosen refers to the deceptive superficial resemblance of the plant to *Agapetes praeclara*, which is quite extraordinary. Except for the fact that in *A. praestigiosa* the nerves on the lower leaf-surface are somewhat more prominent, and the leaves themselves rather more strongly pungent-tipped, in foliage the two species are practically indistinguishable. The corolla, however, in *A. praestigiosa* is a small, strongly angled, subglobose structure, recalling that of *A. miranda* A.S., and, to a lesser extent, that of *A. subvinacea* A.S. (see below, p. 500). I now believe that these two species, together with *A. serpens* (Wight) Sleumer, originally placed under the second half of the primary dichotomy of my key to Series *Pteryganthae* (see *K.B.* 1948, 97-98), should be associated with the present series.

13. **Agapetes refracta** *Airy Shaw*, sp. nov., nulli adhuc descriptae arcte affinis, quoad folia parva ovata crenulata glabra tenuiter chartacea cum *A. anonyma* A.S. tantum comparanda, ob pedicellum elongatum tenuissime filiformem cum *A. pilifera* Hook. fil., ob corollam fere usque dimidium in segmenta anguste lineari-subulata divisam cum *A. bracteata* Hook. f. (et in Serie *Robustarum* cum *A. lobbii* C. B. Cl. et *A. nana* (Griff.) Hook. f.) comparanda; corollae segmentis abrupte reflexis rectis nec revolutis in genere unica.

Suffrutex epiphyticus. *Rami* graciles, 1-2 mm. crassi, dense longiuscule fusco-setosi, regulariter foliati. *Folia* ovata, 1.7-2.8 cm. longa, 0.9-1.7 cm. lata, basi rotundata, apice acuta vel subacuta, margine plano haud crebre crenulata (crenulis utrinque 5-7), tenuiter chartacea, glaberrima, obscura, nullo modo nitentia, costa nervisque supra prominulis crebre reticulatis subtus costa fere plana obscura nervis obscure reticulatis, petiolo 1 mm. longo gracili. *Flores* in axillis superioribus solitarii. *Pedicellus* elongatus, gracillime filiformis, 1.5-2.5 cm. longus, nutans, glaber. *Receptaculum* parvum, elliptico-obovoideum, 1.5-2 mm. diametro, glabrum. *Calycis* segmenta deltoidea, 1.5-2 mm. longa, acuta, basi brevissime connata. *Corolla* rosea, alabastro longe rostrato-ellipsoidea, 1.6-1.8 cm. longa, sub anthesi ellipsoideo-cylindrica, ob segmenta reflexa 1.0 cm. tantum longa; tubus leviter inflato-ellipsoideus, utrinque leviter contractus, glaberrimus, 1.0 cm. longus; segmenta angustissime lineari-subulata, 7-8.5 mm. longa, recta, glaberrima, acutissima, alabastro rostrum rectum anguste subulatum efformantia, sub anthesi angulo acuto refracta, nullo modo revoluta. *Filamenta* angustissime filiformi-subulata, basi per 1.5 mm. oblongo-dilatata, tota 4-5 mm. longa, margine sub lente quasi minutissime asperata; antherae 13-14 mm. longae, thecis oblongis 4-5 mm. longis minute papillosis inter se liberis dorso ecalcaratis basi in caudam brevem communem 0.4 mm. longam desinentibus, rostris 8-9 mm. longis inter se leviter cohaerentibus. *Stylus* filiformis, 1.7 cm. longus, glaber, stigmate truncato haud expanso. *Fructus* ignotus.

ASSAM. Jamiri, 1200-1500 m., 25 Oct. 1935, *F. Kingdon Ward* 12471 (Herb. Mus. Brit.): 'A small epiphytic shrub. Flowers pink, petals reflexed.'

As stated in the diagnosis, this most distinct species cannot be compared with any hitherto described. The small, crenulate, chartaceous leaves,

the long, excessively slender, filiform pedicels, the long, narrow corolla-segments, forming a distinct beak in bud, and sharply reflexed but not revolute at anthesis, and the tailed anthers, form an altogether unusual combination of characters.

I am referring it to the Series *Graciles*, rather than to the *Longifiles*, with which the foliage might suggest some affinity, on the ground of the elongate, filiform, glabrous pedicels (cf. *A. nutans* Dunn [peduncle], *A. angustifolia* (Knagg) Airy Shaw, and *A. mitrarioides* Hook. f. ex C. B. Cl.), the linear, elongate corolla-segments (cf. *A. discolor* C. B. Cl.), the glabrous filaments, and especially the dorsally ecalcarate anther-tubes—characters which are at present not or scarcely known in the *Longifiles*.

14. **Agapetes mitrarioides** Hook. fil. ex C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 447 (1881).

ASSAM. Mishmi Hills: Laimpha, rocks and trees, and Thumath Summit, in arb., 1837, Griffith (Kew distrib.) 3466: 'Ceratostemma? flor. pendulis, corolla coccineo-aurantiacea coccineo-venata, laciniis viridibus. Elegantiss.'

As Clarke well observes (*l.c.*), *A. mitrarioides* is 'a species remote in habit from all others of the genus'. The elongate, slender, densely setose stems, with small dentate leaves, would lead one to expect an affinity with Series *Longifiles*, but the elongate, filiform, minutely puberulous peduncle and pedicels, puberulous receptacle and calyx, and comparatively elongate-cylindric or somewhat ventricose corollas, puberulous on the angles, seem to point elsewhere. It is referred to the present series on the strength of a certain degree of resemblance of the foliage to that of *A. buxifolia* Nutt. ex Hook. f., in combination with the greatly elongate inflorescence and especially the unspurred anthers.

I now believe that a better grouping will be obtained by transferring to this Series *Agapetes buxifolia* Nutt. and *A. lacei* Craib from Ser. *Longifiles*, and *A. serpens* (Wight) Sleumer and *A. miranda* A.S. from Ser. *Pteryganthae*. These agree with the other known species of Ser. *Graciles* in having ecalcarate anthers. In most of the remaining *Pteryganthae*, and in all the *Longifiles* of which the flowers are known, the anthers are dorsally spurred. The glandular 'collarete' at the apex of the pedicel, shown by these species, has been commented upon elsewhere (*K.B.* 1948, 103). The impressed venation of *A. miranda* and *A. subvinacea* A.S. (*sp. nov.*, *infra*) recalls that of *A. praeclara* Marq.

15. **Agapetes buxifolia** Nuttall ex Hook. fil. in Hook. *Bot. Mag.* 83, t. 5012 (1857); C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 447 (1881).

ASSAM (Bhutan border). Duphla Hills, 600–900 m., 1849, Booth; described from cultivated material supplied by Nuttall in 1857. Cultivated specimens grown at Kew, doubtless from the same source, dated May 1863 and April 1883, are preserved in Herb. Kew.

Booth's original wild specimen (in Herb. Kew.) bears a pencil label in his own hand: 'On the 6th (?) from Yomeen (or Gomeen), 2 to 3000'; also a small ticket in Nuttall's hand: 'Dupla also Garrow Hills'. Apart from one later specimen from the same area (Duphla Hills: Yeorsi, 1350 m., 28 Dec. 1874, Lister 134), we have no further information regarding this species.

The leaves on Booth's wild specimen show a range of 1.5–2.8 cm. in length*, and the smallest leaves show a considerable similarity in general shape and texture to those of *A. mitrarioides* Hook. f. ex C. B. Cl. Moreover the filaments are very short and the anthers are dorsally ecalcarate; and since I now regard this latter character as rather important for separating the Series *Graciles* (ealc.) from the *Longifiles* (calc.), I am transferring *A. buxifolia* from the latter series, where I originally located it (*K.B.* 1935, 45, *in clavi*), to the former.

16. **Agapetes lacei** Craib in *Bull. Misc. Inf.*, Kew, 1913, 43 (1913); Evans in *Notes Roy. Bot. Gard. Edinb.* 15, 203 (1927); Airy Shaw in *Bull. Misc. Inf.*, Kew, 1935, 44 (*in obs.*), 45 (*in clavi*); Merrill in *Brittonia*, 4, 158 (1941).

The variations in the indumentum of the receptacle in *A. lacei* were referred to both by Evans (*l.c. supra*) and by myself in my original key to the *Longifiles* (*K.B.* 1935, 45). These variations are so striking that it is convenient to provide varietal names for reference, as already done for *A. setigera* D. Don ex G. Don (*l.c.* 33–36) and *A. variegata* (Roxb.) D. Don ex G. Don (*op. cit.* 1948, 88–90). The specimens collected by Ward on the Vernay-Cutting Expedition (1938–39) and cited by Merrill (*l.c.*) have not yet been seen by me.

var. **glaberrima** Airy Shaw, var. nov., pedicellis receptaculisque glaberrimis.

YUNNAN. N'Maikha-Salwin divide, 26° N., 2400–2700 m., on rocks and cliffs, May 1919, *Forrest* 17912 (typus, Herb. Kew.): 'Shrub of 2–3 ft. Flowers scarlet-crimson, tipped dull olive-green.' *Ibid.*, 26° N., 2100 m., on trees and boulders, Nov. 1919, *Forrest* 18816: 'Shrub of 2 ft. Flowers light crimson, tipped dark green.'

TSARONG, S.E. TIBET. Salwin-Kiu Chiang divide, N.W. of Si-chi-to, 28° 24' N., 98° 24' E., 3000 m., on trees in shady forests, June 1922, *Forrest* 21597 (pro parte, quoad ramos florigeros tantum): 'Epiphytic, pendulous shrub of 1–2½ feet. Flowers scarlet-crimson.'

The Kew sheet of *Forrest* 21597 bears a flowering specimen of var. *glaberrima* and a fruiting one of var. *tomentella*.

var. **setosa** Airy Shaw, var. nov., pedicellis receptaculisque longe glanduloso-setosis tantum.

N.E. UPPER BURMA. On forest trees, 3000–3300 m., 1924–25, *Forrest* 25962: 'Plant of 2–3 ft. Epiphytic. Flowers deep satin crimson.'

This is the only specimen seen with this type of indumentum.

var. **lacei**, pedicellis receptaculisque griseo-puberulis et insuper setis glandulosis paucis praeditis.

The type specimen of the species (BURMA: Bhamo Distr., Lapyeka to Sinlum Kaba, 1500 m., 10 Apr. 1912, *Lace* 5771) shows receptacles and pedicels which are rather closely grey-puberulous, with a very few glandular setae in addition. No other comparable specimen has yet been seen.

var. **tomentella** Airy Shaw, var. nov. pedicellis receptaculisque densiuscule griseo-tomentellis omnino esetosis.

* In cultivated material the leaves may be as much as 4 cm. long.

YUNNAN. On ledges of cliffs in side valleys, 3000 m., May 1924, *Forrest* 24119: 'Shrub $1\frac{1}{2}$ –3 ft.' On forest trees on the hills, $25^{\circ} 25' N.$, $98^{\circ} 30' E.$, 2100 m., June 1925, *Forrest* 26690 (typus, Herb. Kew.): 'Epiphytic shrub of 2–3 ft. Flowers brilliant crimson-scarlet.'

TSARONG, S.E. TIBET. On trees in shady forests on the Salwin-Kiu Chiang divide, N.W. of Si-chi-to, $28^{\circ} 24' N.$, $98^{\circ} 24' E.$, 3000 m., June 1922, *Forrest* 21597 (pro parte, quoad ramos fructigeros tantum): 'Epiphytic, pendulous shrub of 1 – $2\frac{1}{2}$ feet. Flowers scarlet-crimson.'

I have previously (*K.B.* 1948, 103) commented on the curious 'collarette' of glandular bristles borne at the apex of the peduncle in certain species formerly referred to the *Pteryganthae*. From the above list of 'varieties', it will be seen that glandular bristles in fact apparently occur only rarely in *A. lacei*—in vars. *lacei* and *setosa*, of which only one gathering of each is so far known. However, there can be little doubt that even the occasional occurrence of this unusual feature does indicate some real degree of affinity with the species mentioned, and this indication is now strengthened by the discovery of a sterile specimen of *A. serpens* (Wight) Sleumer, from Sikkim (Darjeeling, 2100 m., Dec. 1872, *Gamble* 3671C), in which the foliage is, at first sight, indistinguishable from that of *A. lacei*. That is to say, the leaves are of the same size, shape and general appearance, and show the same characteristic transverse wrinkling on drying. Closer examination reveals, however, the presence of the sharp mucro or close group of aristate teeth at the extreme apex of the leaves, characteristic of *A. serpens*.

It is, of course, possible that an undescribed species is represented, though this seems unlikely, since the specimen was gathered in Sikkim near Darjeeling where *A. serpens* occurs abundantly. It is unfortunate that the material bears neither flowers nor fruits.

17. **Agapetes serpens** (Wight) Sleumer in *Engl. Bot. Jahrb.* **70**, 105 (1939); Airy Shaw in *Kew Bull.* **1948**, 102 (1948).

Vaccinium serpens Wight in *Calc. Journ. Nat. Hist.* **8**, 171 (1847) et *Ic. Pl. Ind. Or.* **4** (1), 4, t. 1183 (1848).

Thibaudia myrtifolia Griff. *Itin. Notes*, 125, no. 434 (1848), c. descr. fl. tantum, et *Ic. Pl. Asiat.* t. 510 (1854).

Pentapterygium serpens (Wight) Klotzsch in *Linnaea*, **24**, 47 (1851); C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* **3**, 449 (1882); Cowan & Cowan, *Trees N. Bengal*, 80 (1929).

Additional material:

BHUTAN. Chungkar, 1800 m., in evergreen forest, on rocks and trees, 24 Feb. 1936, *Ludlow & Sherriff* 1136, *pro majore parte* (Herb. Mus. Brit.): 'Shrub 3–4 ft. (Colour 43) Bright crimson, veins darker crimson.' Tsan-ka, 2250 m., 5 June 1938, *B. J. Gould* 389 (Herb. Kew.).

E. NEPAL. Arun valley, Dhoje N. of Chainpur, on mossy tree trunk, 2250 m., 24 April 1956, *J. D. A. Stainton* 118 (Herb. Mus. Brit.): 'Corolla pinkish white.'

Stainton's specimen is the first that I have seen of this species from Nepal. It shows slightly unusual features in the relatively short (1.4–1.5 cm.), pale

pink corolla, but does not seem worthy of varietal distinction. It has not the strong glandular pubescence of var. *alba* A.S. (*l.c. supra*).

var. **stenophylla** *Airy Shaw*, var. nov. foliis (haud explanatis) 3.0–4.5 mm. tantum latis.

BHUTAN. Tongse, or below Rydang, 1650 m., 1837, *Griffith* (Kew distr.) 3462, *pro parte* (Herb. Kew.). Chungkar, 1800 m., in evergreen forest, on rocks and trees, 24 Feb. 1936, *Ludlow & Sherriff* 1136, *pro minore parte* (Herb. Mus. Brit.): 'Shrub 3–4 ft. (Colour 43) Bright crimson, veins darker crimson.'

Griffith's sheet bears two distinct collections: one from Tongse, the other from below Rydang at 5500 ft. They are unfortunately mounted in such a way that it is impossible to say which label belongs to which specimen. In the case of the Ludlow & Sherriff material, the two forms were apparently growing together.

18. **Agapetes subvinacea** *Airy Shaw*, sp. nov., *A. mirandae* A.S. affinis, sed foliis majoribus paullo tenuioribus subtus dissite sed manifeste setulosis subtus siccitate vinaceis margine pallido subplano, receptaculo 5-alato puberulo, calycis segmentis angustius triangulari-delloideis (nec late ovatis) margine haud denticulato-ciliatis, corolla angustiore differt.

Suffrutex epiphyticus, gracilis, pendulus. *Caules* elongati, gracillimi, 0.5–1.5 mm. diametro, dense fusco-vel (statu juniore) ferrugineo-setosi, parce ramosi, crebriusculi foliati, inferne radices tuberosas 6–7 mm. diametro edentes. *Folia* late ovata usque suborbicularia (rarius late elliptica), 8–14 mm. longa, 6–12 mm. lata, basi rotundata, apice obtusa sed distincte apiculata, margine fere plana sed subtus pulchre undulato-nervosa, minute sed distincte crenulato-denticulata, coriacea, siccitate supra grisea, glabra, subtus pulchre vinacea (margine pallido) et conspicue dissite setulosa, costa nervisque supra ruguloso-impressis subtus prominulis; petiolus 1 mm. longus, gracilis. *Inflorescentiae* 1–2-florae, plerumque ex axillis aphyllis editae: pedunculus subnullus vel usque 4 mm. longus, parce brevissime glanduloso-setulosus; bracteoli minuti, subulati, brunnei; pedicelli gracillimi, 1.0–1.6 cm. longi, sursum sensim ampliati, parce brevissime glanduloso-setulosi, ipso apice velut collari setularum longiorum calycis basi adpresso praediti. *Receptaculum* turbinatum, 2–4 mm. diametro, 5-alatum (alis inter-sepalinis), puberulum. *Calycis* segmenta triangulari-subulata, 3 mm. longa, breviter vel brevissime connata, acuta vel acuminata, integerrima, quam ea *A. mirandae* tenuiora, nervis manifestioribus. *Corolla* (alabastro tantum nota) ut videtur breviter cylindrico-ovoidea, 8 mm. longa, 5 mm. diametro (flore expanso verosimiliter elongatius cylindrica), 5-alata, alis lobis corollinis oppositis (inter-sepalinis) breviter glanduloso-ciliatis, ceterum glabra, alabastro viridula; lobis brevibus 1–2 mm. longis. *Stamina* (alabastro) 7 mm. longa: filamenta brevissima, 1 mm. longa, basi ovato-expansa, dein subulata, minute papilloso-puberula; antherae oblongo-lanceolatae, 6 mm. longae (rostris 4 mm. longis inclusis), leviter cohaerentes, papillosae, dorso ecalcaratae. *Stylus* 7 mm. longus, glaber, stigmatibus vix expanso. *Fructus* (immaturus) globosus, 4–5 mm. diametro, puberulus, leviter 5-angulatus, calyce persistente coronatus.

UPPER BURMA. Nam Tamai valley, 27° 45' N., 97° 50' E., 2400–2700 m., 19 Nov. 1937, *F. Kingdon Ward* 13482 (typus, Herb. Mus. Brit.): 'An epi-

phyte growing in the moss forest, hanging from the trees in streamers. Very like no. 13481 [*A. pensilis* A.S. and *A. pachyacme* A.S.] at first sight, but leaf margin serrate, leaves rounded. In bud, flowers greenish. Also in fruit. Pedicel long and slender, the whole almost glabrous.' Nam Tamai valley, in jungle, 300 m., no date, *F. Kingdon Ward* 13295 (Herb. Mus. Brit.): 'An epiphyte, the shoots hanging down. Flower buds green.'

This attractive species to some extent bridges the gap between *A. serpens* (Wight) Sleumer and *A. miranda* A.S. It is unfortunate that no mature, open flowers are present on either of Ward's specimens, but comparison with buds of *A. serpens* suggests that the corolla will probably be at least shortly cylindrical. It is noteworthy that both calyx and corolla are winged: in *A. serpens* and the members of Series *Pteryganthae* only the calyx is winged, in *A. miranda* only the corolla.

19. **Agapetes miranda** *Airy Shaw* in *Kew Bull.* 1948, 102 (1948).

Additional material:

ASSAM. Poshing La, Assam Himalaya, 2400 m., 16 May 1938, *F. Kingdon Ward* 13651 (Herb. Mus. Brit.): 'A common epiphyte, hanging down from the tree trunks in temperate forest. Stems, pedicels and calyx rim bristly. Anthers not produced at the apex, and without horns; filaments glabrous. Corolla white, subglobular, with minute green teeth.'

This gathering agrees closely with the type collection from the Pachakshiri district of S.E. Tibet. The leaves are a trifle longer (up to 9 mm.). One inflorescence shows the (evidently abnormal) development of a *peduncle*, about 6 mm. long, bearing two flowers, of which the upper has a pedicel 12 mm. long, and the lower, with a pedicel of 3 mm., has aborted.

SERIES LONGIFILES

Four new species are described in this series, whilst two formerly included here are transferred to Series *Graciles*. All the species of which flowers are known are now characterized by dorsally spurred anthers.

The series is now subdivided into the following groups.

Subseries **Racemosae** *Airy Shaw*. Flores racemosi vel elongate corymbosi, bracteis saepe magnis et persistentibus. (Incl. Sect. *Holocalyx* Prain).—Typus: *A. pottingeri* Prain.

Subseries **Piliferae** *Airy Shaw*. Flores 1–4-fasciculati, pedicellis elongatis filiformibus glanduloso-pilosis; corolla parva, campanulata; folia abrupte caudata. (*Vaccinium* Sect. *Galeopetalum* J. J. Sm., pars, sensu Sleumer in Engl. Bot. Jahrb. 71, 418, 428, 441, 444: 1941).—Typus et sola species: *A. pilifera* Hook. f.

Subseries **Oblongae** *Airy Shaw*. Flores fasciculati, pedicellis mediocribus vel longioribus haud filiformibus; receptaculum longisetosum; folia chartacea, 4 cm. longitudinis excedentia.—Typus: *A. oblonga* Craib.

Subseries **Fasciculiflorae** *Airy Shaw*. Flores brevissime 4–7-corymboso-fasciculati, dense glanduloso-setosi; folia ovata, integra, coriacea, 1–3 cm. longa.—Typus et sola species: *A. fasciculiflora* *Airy Shaw*, sp. nov. (*infra*).

Subseries **Cuneatae** *Airy Shaw*. Flores 1-3-fasciculati, glabri vel puberuli; folia obovata vel oblanceolata, basi cuneata, integra, coriacea.—Typus: *A. kanjilali* A. Das.

Subseries **Subsessiles** *Airy Shaw*. Flores 1-3-fasciculati, subsessiles vel brevissime pedicellati, plerumque dense glanduloso-setosi; folia parva, coriacea (raro tenuiter chartacea).—Typus: *A. pensilis* *Airy Shaw*.

SERIES LONGIFILES

Key to Species

Flowers racemose or corymbose (peduncle well developed) (Subser. RACEMOSAE):

Bracts large, 5-15 mm. long, 2-4 mm. wide, persistent:

Leaves large, 12-18 cm. long, gradually acuminate-attenuate; calyx-segments connate more than half-way; corolla-lobes very short, deltoid . . . 1. *A. pottingeri* Prain

Leaves smaller, not more than 6 cm. long; corolla divided at least half-way:

Leaves ovate-lanceolate, rather abruptly caudate-acuminate, 3.5-6 cm. long; calyx segments lanceolate-subulate . . . 2. *A. bracteata* Hook. fil.

Leaves obovate-oblong, completely rounded at apex, 2-3 cm. long; calyx-segments short, ovate-deltoid . . . 3. *A. saxicola* Craib

Bracts not yet known, early caducous, leaving a distinct scar; leaves rather abruptly or gradually acuminate, 4-4.5 cm. long, stiffly coriaceous; calyx-segments broadly lanceolate-deltoid, connate half-way; corolla-lobes very short, deltoid

4. *A. adenobotrys* *Airy Shaw*

Flowers fascicled or solitary (peduncle very short or obsolete):

Pedicels elongate, 1.5-2.5 cm. long, glandular-pilose:

Pedicels filiform; corolla shortly campanulate, 5-7 mm. long; leaves abruptly and slenderly caudate, drying blackish (Subser. PILIFERAE) . . . 5. *A. pilifera* Hook. fil.

Pedicels of moderate thickness, puberulous as well as sparsely glandular-pilose; corolla cylindric, 1.5-2.2 cm. long; leaves gradually acuminate, drying greenish-brown (Subser. OBLONGAE) . . . 6. *A. oblonga* Craib var. *longipes* *Airy Shaw*

Pedicels less than 1.3 cm. long:

Leaves 4-11.5 cm. long; flowers fascicled; receptacle long-setose (Subser. OBLONGAE); Branches leafy throughout; leaves up to 11.5 cm. long; pedicels 8-12 mm. long; filaments glabrous . . . 6. *A. oblonga* Craib

Branches leafy only at tips, bare below; leaves up to 6 cm. long; pedicels 5-6 mm. long; filaments sparsely pubescent . . . 7. *A. cauliflora* Merr.

Leaves mostly less than 4 cm. long:

(C) Flowers distinctly pedicellate (pedicel over 5 mm. long); leaves entire:

Leaf-base rounded; lamina ovate, 2-3 cm. long, acuminate; flowers in fascicles of 4-7 from distal leaf-axils, densely glandular-setose and puberulous; corolla cylindric, 1.7 cm. long (Subser. FASCICULIFLORAE)

13. *A. fasciculiflora* *Airy Shaw*

Leaf-base distinctly cuneate (Subser. CUNEATAE):

Leaves acutely pungent-cuspidate at apex . . . 8. *A. wardii* W. W. Sm.

Leaves rounded or emarginate at apex:

Leaves narrowly elliptic-oblancoate, 2.5-3 cm. long, 7-9 mm. broad, retuse; receptacle densely cinereo-puberulous; corolla up to 3.8 cm. long, externally minutely puberulous; filaments glabrous; stems not setose

9. *A. kanjilali* A. Das

Leaves obovate (or, if narrowly oblanceolate, less than 6 mm. wide); receptacle glabrous or sparingly and minutely puberulous; corolla 0.5-2 cm. long; filaments pubescent:

Stems setose:

Leaves larger, variable in shape, 1.8-4.5 cm. long, 0.6-2.2 cm. broad, apex slightly retuse or deflexed-cuspidate; pedicels short, corolla cylindric . . . 10. *A. hosseana* Diels

Leaves smaller, spatulate-oblancoate, $\pm$ 1 cm. long, 3-6 mm. broad, apex perfectly rounded; pedicels long, corolla shortly campanulate (conical in bud) . . . 12. *A. obovata* (Wight) Hook. fil.

Stems not setose (but may be sometimes puberulous):

Leaves larger, 1.8-4.5 cm. long, 0.6-2.2 cm. broad, often drying somewhat reddish below; corolla red . . . 10. *A. hosseana* Diels

Leaves smaller, 1.3-2.5 cm. long, 0.3-1.1 cm. broad, usually drying green below; corolla white or greenish-white or pale yellow (rarely 'orange-red') . . . 11. *A. mannii* Hemsl. (*A. yunnanensis* Franch.)

(CC) Flowers subsessile or very shortly pedicellate (pedicel rarely up to 5 mm. long), solitary or rarely 2-3 together; corolla pubescent outside; filaments pubescent (Subser. SUBSESSILES):

Leaves more or less pubescent beneath:

Leaves 1.5-2.4 cm. long, rigidly but thinly coriaceous, sub-bullate, longly and loosely pilose below; nervation distinct . . . 19. *A. vernayana* Merr.

Leaves 1-1.9 cm. long, rigidly and rather thickly coriaceous, flat, very sparingly and shortly pilose on both surfaces when mature but rather densely pubescent when young; nervation impressed above and very obscure below

20. *A. pensilis* Airy Shaw

Leaves quite glabrous beneath (rarely with an occasional seta on the midrib):

Leaves 8-15 mm. long:

Leaves entire, abruptly narrowed into a long pungent mucro

22. *A. epacridea* Airy Shaw

Leaves obscurely crenulate towards apex, acute or apiculate, but not ending in a pungent mucro . . . 21. *A. trianguli* Airy Shaw

Leaves larger (never pungently mucronate):

Leaves entire, with revolute margins, stiffly coriaceous:

Margin pale-cartilagineous; apiculus conspicuous, 1-2 mm. long, pale, blunt, often shortly aristate or tridentate . 16. *A. pachyacme* Airy Shaw

Margin concolorous; apiculus minute (0.2 mm.)

15. *A. brachypoda* Airy Shaw

Leaves conspicuously crenulate-serrate, margins not markedly reflexed, subcoriaceous to thinly chartaceous:

Leaves ovate with a rounded base, thinly chartaceous, dull, finely serrulate almost to the base; nerves scarcely elevate

14. *A. anonyma* Airy Shaw

Leaves elliptic-obovate with a cuneate base, subcoriaceous, shining, subentire towards the base, with more conspicuously elevate nervation:

Leaves 7-10 mm. wide, mostly subacute, less closely crenulate, more strongly nerved . . . 17. *A. spissa* Airy Shaw

Leaves 9-15 mm. wide, obtuse, more closely crenulate, more finely nerved, intra-marginal nerve more distinct

18. *A. spissiformis* Airy Shaw

SUBSERIES RACEMOSAE

2. *Agapetes bracteata* Hook. fil. ex C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 448 (1881).

A. subcaudata Merr. in *Journ. Arn. Arb.* 21, 381 (1940), **synon. nov.**

BURMA. On rocks, Thoun-gyun (? -gyeen), Moulmein, 1500 m., n.d., Lobb: 'Shrub, 2 feet. White & purple.' *Sine loc.*, mountains, 1868, Parish 1032: 'A shrub'.

ANNAM. Pic de Langbian, Dalat, rain-forest, 2000 m., 12 March 1939, Mrs. H. Greenway 24 (Herb. Arn. Arb.): '1 foot high; flower white and pink'.

Merrill stated that his *Agapetes subcaudata* differed from *A. bracteata* 'in numerous characters, particularly in its longer strictly racemose inflorescences'. This was probably due to Clarke's misleading description of the inflorescences of *bracteata* as 'corymbs'; Merrill probably did not see type material. The inflorescences of *A. bracteata* are racemes, exactly as in *A. subcaudata*; in the type material they are perhaps slightly less well developed, but the maximum measurement is about 5 cm., as compared with the 6-8 cm. of *subcaudata*. The calyx-segments of the latter are a trifle shorter and broader, i.e. more deltoid, than those of *bracteata*. Otherwise the Annam material is an excellent match of the Burmese, and the reduction of Merrill's species is inevitable. It is interesting and unexpected to find this evidently rare species turning up about 800 miles south-east of its previously known station.

SUBSERIES OBLONGAE

6. **Agapetes oblonga** Craib in *Bull. Misc. Inf.*, Kew, **1913**, 43 (1913); Evans in *Notes Roy. Bot. Gard. Edinb.* **15**, 204 (1927); Airy Shaw in *Bull. Misc. Inf.*, Kew, **1935**, 45 (1935) et in *Kew Bull.* **1948**, 94 (1948), in *clavibus*; Merr. in *Brittonia*, **4**, 158 (1941).

var. **longipes** Airy Shaw, var. nov., fasciculis paucifloris (1-4-floris) pedicellis elongatis 1.5-2.5 cm. longis distincta.

BURMA-TIBET FRONTIER. Seinghku Wang, 1500-1650 m., 15 May 1926, *F. Kingdon Ward* 6710 (typus, Herb. Kew.): 'Epiphyte, with long limp branches which hang down many feet, over the river or elsewhere. Flowers scarlet, with a green rim. The young fruit is bearded with long crimson hairs.'

UPPER BURMA. Kachin State: North Triangle (Hkinlum), 2100 m., 20 April 1953, *F. Kingdon Ward* 20685 (Herb. Mus. Brit.): 'A bristly shrub, epiphytic in the temperate rain forest. Flowers crimson with green-rim.'

The exceptional length of the pedicels in Ward's Seinghku Wang specimen escaped my notice in previous contributions. In the great majority of specimens of *A. oblonga* the average length of the pedicels is about 0.8-1.2 cm.

A curious feature of the leaves of *Agapetes oblonga* is that they often bear one or two long, narrow, aristate teeth on either side, immediately below the apex. Most of Forrest's Yunnan specimens show this very clearly, and it can be seen, though less markedly, on the type specimen (*Lace* 5772, from the Bhamo district of Burma). Some leaf-margins also show faint traces of an exceedingly minute denticulation: this feature, combined with the chartaceous texture of the leaves and the character of the nervation, suggests the possibility of an affinity between *A. oblonga* and *A. anonyma* A.S. The leaves of the latter species are remarkably reminiscent of the smaller, shorter leaves of *A. oblonga*.

Agapetes sp. nov.? (aff. *A. oblongae* Craib et *A. cauliflorae* Merr.).

UPPER BURMA. Kachin State: North Triangle (Hkinlum), in forest, 900 m., 2 May 1953, *F. Kingdon Ward* 20764 (Herb. Mus. Brit.): 'A small epiphytic shrub. Branchlets bristly. Leaves glabrous. Pedicels pilose: flowers crimson, glabrous.'

The material is scarcely more than a scrap, with a dozen leaves and two flowers, from one of which the corolla has fallen.

The leaves are very similar, in texture, venation, and general outline, to those of *A. oblonga*, but differ in their broadly cuneate, not rounded, base. They are closer in this respect to those of *A. cauliflora*, but even in that species the leaves, though narrowed to the base, are abruptly contracted into the petiole. The leaves of *K.W.* 20764 are elliptic or slightly oblong-elliptic in outline, 3.2-5.0 cm. long, 1.2-2.0 cm. broad, and thus somewhat smaller than those of *A. cauliflora*; they are also much more acuminate than those of that species.

The flowers are apparently quite glabrous. They show no sign of the conspicuous glandular-setose indumentum of *oblonga* and *cauliflora*, and are, in fact, very similar to those of *A. wardii* W. W. Sm., a species which, on

account of its entire, very acute leaves, probably belongs in this affinity. The pedicels of *K.W.* 20764 are finely and rather sparsely puberulous (the 'pilose' of the field note is an over-statement); those of *wardii* are quite glabrous. The calyx-segments are rather shorter than those of *wardii*.

In view of the scrappiness of the material, and the absence of certainly distinctive characters, I leave this plant unnamed.

SUBSERIES CUNEATAE

8. **Agapetes wardii** *W. W. Smith in Notes Roy. Bot. Gard. Edinb.*, **8**, 330 (1915); Evans in *op. cit.* **15**, 206 (1927).

Additional material:

UPPER BURMA. Kachin State: North Triangle (Arahku), in warm temperate forest, 1800–2100 m., 3 April 1953, *F. Kingdon Ward* 20602 (Herb. Mus. Brit.): 'An epiphytic undershrub of bushy habit, quite glabrous except for the branchlets which are clothed with adpressed bristles. Young foliage salmon pink. Flowers scarlet with pale green teeth. Filaments and style glabrous.' North Triangle (Hkinlum), in forest, 1950 m., 2 May 1953, *F. Kingdon Ward* 20767 (Herb. Mus. Brit.): 'An epiphytic shrub in young fruit. Leaves purple beneath. Branchlets bristly. Style and ovary glabrous.'

There is some variation in the degree of connation of the calyx-segments in *A. wardii*. In the type (not seen), the calyx is described as 'vix ad medium fissus', but in the present specimens it is divided distinctly beyond the middle, and in *Forrest* 26547 and *Sukoe* 9828 (Herb. Kew.) the division extends to three-quarters, with narrowly lanceolate segments 3–4 mm. long.

In his original description of this species, Wright Smith wrote of the stamens: 'calcaribus nullis'. For my original key to the *Longifiles* (*K.B.* **1935**, 45), I rather uncritically accepted this statement, but I now find that the anthers are, in fact (at least sometimes), minutely spurred on the back. *A. buxifolia* Nutt. (with which it was coupled in the key), and also *A. lacei* Craib, being now transferred, on this and other grounds, to the Series *Graciles*, this removes the last anomaly in this respect from the *Longifiles*, all the species of which, so far as is known, possess spurred anthers. *A. wardii* is evidently not (as stated by Smith) 'nearly related' to *A. buxifolia*; but it may have some connection, as he suggests, with *A. mannii* Hemsl. (*A. yunnanensis* Franch.), though it is actually somewhat isolated in the series.

10. **Agapetes hosseana** *Diels in Fedde, Rep. Spec. Nov.* **1**, 16 (1905); Fletcher in Craib (ed. Kerr), *Fl. Siam. Enum.* **2** (4), 311 (1938).

This species seems to be almost confined to Siam. The following is the only specimen that I have seen from outside of Siamese territory.

LOWER BURMA: Tenasserim: Moo-ley-it Mountain, 1950 m., n.d. (before 1885), *Beddome* 4759 (Herb. Mus. Brit.).

A. hosseana can almost always be distinguished from its close ally, *A. mannii* Hemsl. (*A. yunnanensis* Franch.), by its setose stems (at least when young), a character unfortunately omitted from my earlier key (*K.B.* **1935**, 45). When, as very occasionally happens (as pointed out by Fletcher, *l.c. supra*), this character fails, then the mostly broader, slightly thinner leaves, and red,

not white, corollas, are usually sufficient for indentification. The mature leaves often dry a distinctly reddish colour on the underside. It must, however, be admitted that smaller-leaved forms of *A. hosseana* and larger-leaved forms of *A. mannii* are sometimes difficult to distinguish, especially in the absence of flowers: and even these are not infallible, since Forrest has noted on one of his Yunnan specimens (no. 4189), which on account of its small narrow leaves and non-setose stems is apparently referable to *A. mannii*: 'Flowers orange-red'.

11. ***Agapetes mannii* Hemsl.** in *Gard. Chron.*, ser. 3, **12**, 364 (1892) et **28**, 254 (1900); Brandis, *Ind. Trees*, 405 (1906).

Agapetes yunnanensis Franch. in Morot, *Journ. de Bot.* **9**, 366 (1895); Evans in *Notes Roy. Bot. Gard. Edinb.* **15**, 206 (1927); **synon. nov.**

Agapetes mannii was described by Hemsley from cultivated material sent home by Gustav Mann from the Khasia Hills of Assam and grown at the Royal Botanic Gardens, Kew. No wild material seems ever to have been collected in the type locality, either before or since, although further cultivated material from seed obtained in Manipur State (*Kingdon Ward* 19097) has recently become available. But although the type material of *A. mannii* represents a small-leaved form, it is perfectly matched by specimens of 'yunnanensis' collected in Yunnan and Burma, and the reduction of *A. yunnanensis* Franch. to *A. mannii* Hemsl. is therefore inevitable.

The closest relatives of *A. mannii* are certainly *A. kanjilali* A. Das (Assam, Lakhimpur Distr.) and *A. hosseana* Diels (Siam and Lower Burma). These three species have a more or less retuse or deflexed-apiculate leaf-apex (not always clearly visible in all leaves, but at least some will show it). *A. obovata* (Wight) Hook. fil., on the other hand, which has sometimes been confused with *A. mannii* on account of the similar general leaf-shape, is not really so closely related: apart from the very different, long-pedicellate, shortly campanulate corolla, the leaf-apex is always perfectly rounded, *never* retuse or apiculate; the leaves are somewhat thinner in texture and much more constant in size; and the stem is setose (agreeing in this character with *A. hosseana*).

The following material is referable to *A. mannii*.

ASSAM. Khasia Hills, 1889, *G. Mann* (type; cult. in Hort. Kew.). Manipur State, Sirhoi, on old oak trees along the ridge on the edge of the forest, 2250 m., 25 July 1948, *F. Kingdon Ward* 17860 (Herb. Mus. Brit.): 'An epiphytic shrub. Flowers almost white with a faint tinge of green. Filaments woolly.' Manipur State, *sine loc. exact.*, on trees and on rocks in the forest, 2400 m., 1949, *F. Kingdon Ward* 19097: 'Bushy shrub; flowers not seen; berries large, claret-red' (cult. in Hort. Kew. from seed received from New York Botanic Garden, Feb. 1950; flowered August 1955; flowers pale yellow).

BURMA. W. Central Burma: Ranchi, $\pm$ 2400 m., 17 June 1956, *F. Kingdon Ward* 22355 (Herb. Mus. Brit.): 'An epiphytic undershrub, the long stems hanging down the trunks of the trees. By far the commonest, and perhaps the only epiphyte above 2550 m. Leaves glabrous. Calyx pilose. Corolla almost white, faintly tinged green, teeth-like lobes green; glabrous. Anthers with processes.' W. Central Burma: Mt. Victoria, 2400-2700 m., 27 October

1956, *F. Kingdon Ward* 22776 (Herb. Mus. Brit.): 'An epiphytic bushy under-shrub. First collected in flower in June. Flowers white; fruits not ripe. Common.' N.E. Upper Burma, on trees in forests on the hills, 25° 58' N., 98° 29' E., 2400-2700 m., July 1925, *Forrest* 27145: 'Epiphytic evergreen shrub of 2-3 ft. Branches pendulous.' N.E. Upper Burma, Oct. 1925, *Forrest* 27406 (= F. No. 26585').

YUNNAN. S.W. Yunnan: Tali, Mt. Tsang-Chan, c. 1894, *Delavay* 1681 (typus, Herb. Paris.). Eastern flank of the Tali Range, on dry ledges of cliffs and on humus-covered boulders, 23° 40' N., 3300-3600 m., July 1906, *Forrest* 4189: 'Shrub of 6-18 inches. Flowers orange-red.' S.W. Yunnan: Lichiang Range, 1933, *H. D. McLaren's native collectors* L.130 A and 188 C. S.E. Yunnan: Mengtsze, rock mts., 2100 m., n.d., *Henry* 11218 and 11219: 'Low prostrate shrub; white flowers; fruits white to pale pink.'

12. ***Agapetes obovata*** (Wight) Hook. fil. in Benth. et Hook. fil. *Gen. Pl.* 2, 572 (1876); C. B. Clarke in Hook. fil. *Fl. Brit. Ind.* 3, 447 (1881).

Vaccinium obovatum Wight, *Ic. Pl. Ind. Or.* 4 (1), 5, t. 1193 (1848).

Thibaudia obovata (Wight) Griff. *Itin. Notes (Posth. Papers* 2), 160, sub no. 820 (1848), in obs. [nec A. C. Smith in *Contrib. U.S. Nat. Herb.* 28, 431 (1932)].

ASSAM. Khasia Hills: 'Cheera Pungee', *Griffith*.

The distinctive features of this species, which is evidently a common one in the Khasia Hills, have been noted above in the discussion under *A. mannii* Hemsl.

SUBSERIES FASCICULIFLORAE

13. ***Agapetes fasciculiflora*** *Airy Shaw*, sp. nov., nulli adhuc descriptae arcte affinis, foliis ovatis acuminatis integris glabris, inflorescentiis 4-7-floris brevissime corymboso-fasciculatis dense glanduloso-pubescentibus, corollis pallidis distinctissima.

Frutex epiphyticus. *Ramuli* modice robusti, rigidi, recti, usque 3 mm. crassi, breviter fusco-setulosi. *Folia* ovata, 2-3 cm. longa, 1-1.5 cm. lata, basi rotundata vel latissime cuneata, apice sensim acuminata, acuta, saepe deflexa, margine integro subplano, rigide coriacea, glaberrima, siccitate supra subnigrescentia vel livide viridia, saepe granuloso-rugulosa (sed statu vivo, teste collectore, 'polita'), subtus lucidula, viridescens, saepe irregulariter pustulosa; costa et nervi supra altius insculpta, subtus inconspicua; petiolus 1-2 mm. longus, gracilis, glaber. *Inflorescentiae* ex axillis foliorum distalium editae, brevissime corymboso-fasciculatae, pendulae, 4-7-florae, floribus confertis; pedunculus brevissimus, 1-3 mm. longus; pedicelli 4-7 mm. longi, dense glanduloso-pubescentes, basi bracteola minuta 1 mm. longa suffulti. *Receptaculum* 1.5-2.0 mm. diametro, dense patenter glanduloso-setosum. *Calycis* segmenta ovato-triangularia, usque ad dimidium connata, 2.5-3 mm. longa, acuta, dense glanduloso-setosa. *Corolla* anguste cylindrica (alabastro apicem versus subconica 5-angulata), 1.7-1.8 cm. longa, 3 mm. diametro, alba vel rosea, extra glanduloso-pubescentia et minute puberula, intus superne minute puberula, segmentis ovato-triangularibus reflexis acutis viridibus intus puberulis. *Filamenta* anguste linearia, 7-8 mm. longa, pubescentia. *Antherae* oblongo-lanceolatae, 5-6 mm. longae, rostris rectis

liberis dorso basin versus calcaratis, calcaribus brevibus sursum spectantibus. *Stylus* filiformis, 1.8 cm. longus, glaber, stigmatibus vix expanso. *Fructus* ignotus.

UPPER BURMA. Kachin State: North Triangle (Hkinlum), 1200 m., 24 Nov. 1953, *F. Kingdon Ward* 21701 (Herb. Mus. Brit.): 'An epiphytic shrub with bristly branchlets and glabrous polished leaves, recalling some species of *Cotoneaster*. Flowers white with green teeth, or pink; calyx, corolla and pedicels tomentose'.

This very distinct *Agapetes*, though apparently referable to Series *Longifiles*, is not closely related to any hitherto known species. The ovate-acuminate leaves dry a curious livid blackish-green on the upper surface, and a dull sap-green below. The upper surface is dull and granular-rugulose, with deeply impressed midrib and (to a lesser extent) lateral nerves; the under-surface is smoother and more shining in the younger leaves, but in both mature and young leaves it exhibits a curious pustulate appearance. The foliage is (apart from the entire margins) perhaps more suggestive of certain species in the Series *Graciles*—e.g., *A. discolor* C. B. Cl., *A. forrestii* W. E. Evans; *A. praeclara* Marq.—than of anything in the *Longifiles*. The dense-flowered, pendulous, fasciculate corymbs, borne in the 'terminal' or subterminal leaf-axils of the rigid branchlets, together with the long filaments and spurred anthers are, however, quite unlike anything in the *Graciles*, and can only justify a reference to the present series.

SUBSERIES SUBSESSILES

16. ***Agapetes pachyacme*** *Airy Shaw*, sp. nov., *A. brachypodae* A.S. ut videtur affinis, a qua foliis minus crasse coriaceis magis oblongis conspicue albo-cartilagineo-marginatis, marginibus valde revolutis, in apiculum obtusum album saepe tridentatum longiuscule angustatis, pagina superiore siccitate aliter ruguloso-contracto differt.

Suffrutex ut videtur epiphyticus. *Rami* elongati, simplices vel parum ramosi, longe et dense castaneo-setosi, 1–2 mm. diametro, superne $\pm$ bifariam foliosi. *Folia* plerumque breviter oblonga, interdum ovato-oblonga vel subelliptica, 1.5–2.5 cm. longa, 0.7–1.3 cm. lata, basi rotundata, rarius leviter angustata, apice in apiculum latum obtusum album longiuscule angustata, ipso apiculo cartilagineo saepe tridentato vel breviter aristato, marginibus integris conspicue albo-cartilagineis valde revolutis, utrinque glaberrima, siccitate supra grisea, nervis leviter impressis, epidermi contractione mesophylli secus nervos argute canaliculato-elevato, subtus (praesertim statu juniore) castanea, laevia, nervis obtuse elevatis; petiolus 1–2 mm. longus, gracilis, glaber. *Flores* et *fructus* ignoti; inflorescentiae e gemmis late perulatis terminalibus ortae?

BURMA. Nam Tamai valley, Mungku Hkyet, 27° 45' N., 97° 50' E., 2400–2700 m., 19 Nov. 1937, *F. Kingdon Ward* 13481 A (Herb. Mus. Brit.).

The material consists of three separate pieces, mounted on a sheet with a single piece of *A. pensilis* A.S., to which the descriptive field notes evidently mainly apply. (See under *A. pensilis*, below). It is most unfortunate that neither flower nor fruit is present (although fruits are present on the material of *pensilis*); but (as in *A. anonyma* and *A. spissiformis*) the foliage is so very distinct that it seems best to provide a name and description rather than await the uncertain eventuality of the receipt of flowering specimens.

The relatively broad, white, cartilaginous leaf-margin, so strongly revolute in the dried state as to be usually invisible from above, the rather long, broad, blunt, white apiculus, which is often shortly 3-toothed like a 3-pronged fork, or, if entire, shortly aristate, and the curious wrinkling of the upper leaf surface, suggesting the presence of a somewhat fleshy mesophyll, beneath a thin epidermis, render this a very distinct species. The general affinity with *A. brachypoda* seems fairly clear, although the possibility of its being ultimately referable to *Vaccinium* is also not to be excluded.

18. **Agapetes spissiformis** *Airy Shaw*, sp. nov., *A. spissae* A.S. (saltem quoad folia) persimilis, sed ut videtur minus dense ramosa, foliis paullo majoribus et re vera et pro rata latoribus apice obtusioribus textura tenuioribus subtilius nervosis crebrius crenulatis, nervo intramarginali distinctiore satis diversa.—*Agapetes* forsan sp. nov., *Airy Shaw* in *Kew Bull.* **1948**, 94 (1948).

Suffrutex parvus, epiphyticus. *Caules* haud valde robusti, 1.5–3 mm. crassi, modice ramosi, densiuscule fusco-setosi. *Folia* secus ramulos satis dense disposita, elliptico-obovata, interdum subrhomboidea, 1.8–2.9 cm. longa, 0.9–1.5 cm. lata, inferne in petiolum brevissimum cuneato-angustata, apice obtusa vel subrotundata, rarius subacuta, chartacea (more *A. anonymae* A.S.), glaberrima, margine subplano crebre sed inconspicue crenulato-denticulata (denticulis apicalibus sub lente minutissime glanduloso-aristatis), statu juniore lucidula, matura haud nitentia obscura, siccitate subtu viridia (nec ut in *A. spissa* purpurascens); costa et nervi utrinque tenuissime et prominule reticulati, in nervum intra-marginalem gracilem distincte anastomosantes; petiolus subnullus. *Flores* solitarii, subsessiles; corolla et androecium ignota. *Fructus* (? immaturus) parvus, globosus, 3–4 mm. diametro, dense longe ferrugineo-glanduloso-setosus, calycis segmentis ovato-lanceolatis acutis erectis emarcidis coronatus; pedicellus 1–2 mm. longus.

UPPER BURMA. Hills east of the Mali Hka, 27° 30' N., 1500 m., 31 July 1937, *F. Kingdon Ward* 12872 (Herb. Mus. Brit.): 'A small epiphytic shrub in the rain forest. Fruiting; fruit covered with long bristly hairs.'

As in the case of *Agapetes anonyma* A.S. (*K.B.* **1948**, 95), which I at one time refrained from describing, I now feel convinced, after further study, that the foliage of the present plant is so distinct as to warrant description in the absence of flowers.

20. **Agapetes pensilis** *Airy Shaw* in *Bull. Misc. Inf.*, *Kew*, **1935**, 52 (1935); *Hook. Ic. Plant.* **33**, t. 3256 (1935); *Kew Bull.* **1948**, 97 (1948), *in clavi*.

Additional material:

UPPER BURMA. Nam Tamai Valley: Mungku Hkyet, 27° 45' N., 97° 50' E., 2700 m., 19 Aug. 1937, *F. Kingdon Ward* 12972 (Herb. Mus. Brit.): 'An epiphyte, buried in moss on the trees, and hanging down long shoots. Bulbous masses of hard tissue (water-storing?) occur along the stems. Flowers greenish or white, with pink stripes and green teeth. Anthers horned. Berry red, as large as a cherry, usually buried in the moss. The seeds germinate in the berry, and are washed off into the moss and distributed by contact. Filaments hairy their whole length; tips of anthers cohering. Corolla hairy with long gland-tipped hairs; calyx with simple hairs.' Mungku

Hkyet, 27° 45' N., 97° 50' E., 2400–2700 m., 19 Nov. 1937, *F. Kingdon Ward* 13481 (= no. 12972, in fruit) (Herb. Mus. Brit.): 'Leaves oval. Leaf margin entire, bristly. Pedicel short and thick as compared with the longer and more slender pedicel of no. 13482 [*A. subvinacea* A.S.—*vide* p. 500]. Fruit and pedicel covered with long hairs.' (Mixed with sterile specimens of *Agapetes pachyacme* Airy Shaw—*vide* p. 508, *supra*).

Some of the leaves on *K.W.* 12972 are of a slightly longer and narrower type than those of the previously known collections, up to 1.9 cm. long and 0.8–1.0 cm. wide. Up to 3 flowers may be borne in a fascicle, and the pedicels are occasionally 5 mm. long. The mixed gathering (no. 13481) with *A. pachyacme* is interesting: the two species were no doubt growing intermingled.

21. ***Agapetes trianguli*** Airy Shaw, sp. nov., *A. pensili* A.S. peraffinis, sed ramulis paullo robustioribus minus ramosis, foliis minoribus 8–15 mm. longis 3.5–8.0 mm. latis plerumque ellipticis subtus glaberrimis secus ramulos dense regulariter $\pm$ bifariam dispositis, corolla sanguinea (nec alba roseo-vittata) differt.

Suffrutex parvus epiphyticus, pro rata parum ramosus. *Caules* 1–1.5 mm. crassi (vetustiores 2 mm.), strictiusculi, dense fusco-setulosi. *Folia* parva, anguste elliptica usque ovata, 8–15 mm. longa, 3.5–8.0 mm. lata, basi in petiolum brevissimum cuneato-angustata, apice acuta, breviter apiculata, margine revoluta apicem versus levissime crenulato-undulato ceterum integro hinc inde minutissime setuloso-ciliato, pagina superiore interdum parce pubescentia, pagina inferiore glaberrima, siccitate supra pallide surde viridia $\pm$ transverse rugulosa, infra brunneo-viridia, plana, coriacea, costa nervisque supra $\pm$ impressis subtus obscurissimis; petiolus 1 mm. longus, glaber. *Flores* solitarii vel bini, parce editi; pedicellus 3–4 mm. longus, dense longe glanduloso-pilosus et insuper minute albo-puberulus, bracteolis parvis scariosis. *Receptaculum* turbinatum, 2–3 mm. diametro, eodem modo ac pedicellum indumento duplici vestitum. *Calycis segmenta* ovato-deltoidæa, usque ad quartam vel tertiam partem connata, 3.0–4.5 mm. longa, basi 2 mm. lata, submembranacea, acuminata, extra longe (sed minus dense ac receptaculum) glanduloso-villosa, intus glabra. *Corollae* tubus cylindricus, 1.9 cm. longus, pressione 5–7 mm. latus, extra (praesertim secus vittas petalinas) longe glanduloso-pubescent et insuper minute albo-puberulus; lobi brevissimi, late deltoidei, acuti, revoluti, 1.0–1.5 mm. longi, basi 2 mm. lati, extra glandulosi et puberuli, intus glabri. *Staminum* filamenta gracilia, applanata, 1.2–1.3 cm. longa, basi 0.8 mm. lata, pubescentia; antherae 7.5 mm. longae, dorso bicalcaratae, calcaribus asperatis sursum refractis 1.5 mm. longis. *Stylus* filiformis, 1.6 cm. longus, glaber, stigmate truncato-punctiformi. *Fructus* ignotus.

UPPER BURMA. Kachin State: North Triangle (Hkinlum), in temperate forest, 2100 m., 25 Sept. 1953, *F. Kingdon Ward* 21372 (Herb. Mus. Brit.): 'An epiphytic undershrub. Stem very bristly, leaves glabrous. Corolla blood-red, hairy with rigid hairs, like the calyx.' North Triangle (Tama Bum), 2100 m., 10 Oct. 1953, *F. Kingdon Ward* 21430 (typus! Herb. Mus. Brit.): 'An epiphyte in the forest. Stems bristly, corolla hairy.'

This is very close to *A. pensilis*, but differs in the less slender, less irregularly branched stems, with smaller and somewhat narrower leaves, densely

and more or less bifariously arranged, and in the blood-red (not white and pink-striped) corolla.

The corolla dissected contained three small Dipterous larvae, probably of *Cecidomyiidae*: compare the note under *A. vernayana* in *K.B.* 1948, 95 (1948). There was in this case no sign of damage to corolla or stamens.

SPECIES INCERTAE

THIBAUDIA ORBICULARIS Griff. *Itin. Notes*, 160, no. 820 (1848).

'Ejusdem generis est cum *T. obovata*, discrepans specificè foliis orbicularibus, floribus unibracteatis, calyce ciliato, antheris hirsutis.'

No locality given, but listed with other plants collected by Griffith in the Bhutan mountains, near Santagong and Rydang, March-April 1837.

CERATOSTEMA WIGHTIANUM Griff. *Notulae Pl. Asiat.* 4, 303 (1854).

'Hujus generis nunc species plures mihi notae sunt, quarum binae e collibus Khasiensibus, tres e Mishmeensibus et circiter 6 e collibus Nagensibus proveniunt; una sola floribus solitariis et foliis suborbicularibus gaudet: *C. Wightianum* mihi, Mss. specierum omnium.'

These two entries of Griffith's are very puzzling. Something related to *A. obovata*, but with orbicular leaves, could only be—possibly—*Vaccinium nummularia* Hook. f. et Thoms. ex C. B. Cl., a species that was collected by Griffith (no. 2264; Kew distrib. no. 3460) at least three times in Bhutan (ascent to Woollooke, 8500 ft.; above Juggar and Jaise, 9–10000 ft.; descent to Rydang, oakwoods, 9–7800 ft.). Griffith's specimens do show a ciliate calyx; but, although the filaments are strongly pubescent, the anthers are glabrous. It is difficult to believe that such a careful observer as Griffith could have mistaken filaments for anthers—even more than he could have mistaken the long anther-spurs for pubescence! The flowers of *V. nummularia* are, of course, unibracteate, but only a minority of the leaves could be termed 'orbicular'. Other species with orbicular leaves and ciliate calyces are *V. monetarium* Sleum. and *V. chaetothrix* Sleum., but neither of these have been reported from Bhutan—unless, of course, they were collected by Griffith and the specimens lost.

Ceratostema wightianum Griff. is even more mysterious. No species with solitary flowers and suborbicular leaves appears to be preserved amongst Griffith's material. Several *Agapetes* from Series *Longifiles* (*A. brachypoda* A.S., *A. pensilis* A.S., etc.), and two from Series *Graciles* (*A. subvinacea* A.S., *A. miranda* A.S.) might qualify for the identification. Beyond indicating that his plant came from the mountains of Assam, Griffith gave no precise locality (the note, 'Delvi Nempeum: Journey from Assam to Ava: March 20th, 1837', immediately following the entry, almost certainly indicates the place and date of writing, not of collection). Since his 'manuscript of all the species' seems unfortunately not to have been preserved (it cannot be found at Kew), the species must remain an undeterminable entity.

SECTION PSEUDAGAPETES

Agapetes Sect. **Pseudagapetes** *Airy Shaw*, sect. nov.—*Caules* primo minute puberuli, deinde glabrescentes, laeves, teretes, rigidi, elenticellati. *Folia* late rotundato-ovata, usque 7 cm. longa, rigide coriacea, integerrima,

subtus glanduloso-punctata.—*Flores* majusculi, solitarii vel pauci-fasciculati; pedicello prope basin conspicue bibracteolato. *Calycis* segmenta magna, lanceolato-triangularia, valde nervosa. *Corolla* pro rata brevis, suburceolata, valde glanduloso-setosa, breviter lobata. *Stamina* corollae tubo breviora, filamentis brevibus ciliatis, antheris brevi-tubulosis dorso ecalcaratis. *Fructus* magnus, nitidus.—Typus et sola species: *A. scortechinii* (King et Gamble) Sleumer, Peninsulae Malayanae montium incola.

Agapetes scortechinii (King et Gamble) Sleumer in Engler, *Bot. Jahrb.* **70**, 105 (1939).

Pentapterygium scortechinii King et Gamble in *Journ. As. Soc. Beng.* **74** (2), 60 (1906); Ridley, *Fl. Mal. Penins.* **2**, 205 (1923); Airy Shaw in *Kew Bull.* **1948**, 104 (1948), *in obs.*

Although it may be convenient, for 'technical' reasons, to retain this isolated species within the genus *Agapetes*, it is certainly not possible to include it in any of the four series that have been established for the remaining continental species of the genus. The only species, among these, that exhibits even remotely comparable (though much smaller) foliage is *A. brachypoda* Airy Shaw, in Series *Longifiles*; but most of the remaining characters of *A. scortechinii* are widely different from anything found in that series. The under-surface of the leaves is covered with what appear to be sunken glands, but which may possibly represent the bases of caducous hairs; unfortunately no very young foliage is available to decide this point. But should this prove to be the case, it would be possible to suggest a comparison with the short scattered bristles found on the underside of the leaves of *A. subvinacea* A.S. (Series *Graciles*), and it may be noted that, as in that species, the leaves of *A. scortechinii* sometimes dry a dark vinaceous colour also.

The incidence of some of the other more obvious characters of *A. scortechinii*, with reference to the four series mentioned, may be briefly indicated as follows. A fasciculate inflorescence may occur in all the series except the *Robustae**; glandular setae occur most commonly in Ser. *Robustae* and *Longifiles*, less commonly in *Graciles* and *Pteryganthae*; angled or winged calyces occur only in the two latter series; short or relatively short corollas occur in all four series; ecalcarate anthers are the rule in Ser. *Graciles*, occur variously in Ser. *Robustae* and *Pteryganthae*, but are apparently never found in Ser. *Longifiles*. On balance, connections would seem to be perhaps strongest with *Graciles* and *Pteryganthae*, less strong with *Longifiles*, and definitely weakest with *Robustae*.

It is, however, clear that, in vegetative characters—in the foliage, and in the smooth, terete stems—*Agapetes scortechinii* shows a very evident affinity with the genera occurring farther to the east in Malaysia, such as *Costera*, *Paphia* and *Dimorphanthera*. It is in order to mark the equivocal 'midway' position of this isolated plant that I am proposing the special section *Pseud-agapetes* for its reception. On similar grounds I am unable to support Dr. Sleumer's reference of the New Guinea, Australian and Fijian species (Engl. *Bot. Jahrb.* **70**, 95–106: 1939) to any of the series established for the species of continental Asia. Although the 'technical' floral characters may

* An almost fasciculate inflorescence is, however, found in *A. sikkimensis* A.S.

be present, there are too many additional characters (indicating an altogether new set of genes) coming in with these plants from eastern Malaysia, to warrant their being closely associated with the continental species. It would seem to me advisable to make use of the name *Paphia*, in a sectional or serial sense, for at least some of this eastern group, with perhaps one or two additional groups; but I must leave this to those who have made these plants the object of detailed study.

INDEX

to the three series of notes (*K.B.* 1935, 24-53; 1948, 77-104; 1958, 468-512), and to plates in Hooker's *Icones Plantarum*, 33, tt. 3255-9 (1935).

New species in **bold-face**; synonyms in *italic*.

*Illustrations of these species are in preparation.

<i>acuminata</i>	58, 482	<i>hillii</i>	58, 472
adenobotrys	35, 46; 48, 92	<i>hirsutum</i>	35, 34
<i>affinis</i>	58, 473	<i>hookeri</i>	48, 98; 58, 486
<i>angulata</i>	35, 30; 48, 85; 58, 481	<i>hosseana</i>	58, 505
<i>angustifolia</i>	35, 40; 58, 492	hyalocheilos	35, 42
anonyma	48, 95	<i>incurvata</i>	48, 99; 58, 485
atrosanguinea	58, 494	<i>interdicta</i>	48, 100; 58, 486
<i>auriculata</i>	48, 84	<i>kanjilali</i>	35, 49; <i>Ic.</i> 3255
<i>auriculata</i>	35, 29	kingdonis	58, 489
borii	48, 101; 58, 488	<i>lacei</i>	58, 498
brachypoda	35, 51; <i>Ic.</i> 3257; 48, 94	leptantha*	58, 483
<i>bracteata</i>	59, 503	<i>linearifolia</i>	35, 41; <i>Ic.</i> 3254
<i>brandisiana</i>	35, 32; 58, 479	<i>listeri</i>	48, 101; 58, 488
<i>bulleyana</i>	48, 78; 58, 480	<i>lobbii</i>	35, 37; 58, 476
<i>burmanica</i>	35, 27; 48, 84; 58, 470	<i>loranthiflora</i>	48, 88-90
<i>buxifolia</i>	58, 497	<i>macrophylla</i>	35, 26
<i>campanulata</i>	58, 479	<i>macrostemon</i>	58, 475
<i>cauliflora</i>	48, 92	<i>mannii</i>	58, 506
<i>corallina</i>	35, 37	<i>marginata</i>	58, 471
<i>cordifolia</i>	35, 42	<i>megacarpa</i>	58, 472
<i>desmogyne</i>	35, 39	<i>miniata</i>	58, 480
<i>discolor*</i>	58, 493	<i>minor</i>	58, 491
dispar*	58, 481	miranda*	48, 102; 58, 501
epacridea	48, 94	<i>mitrarioides</i>	58, 497
fasciculiflora*	58, 507	<i>moorei</i>	35, 38; 58, 474
<i>filipes</i>	58, 492	<i>myrtifolia</i>	48, 102; 58, 499
<i>flava</i>	48, 98	<i>nana</i>	58, 473
<i>forrestii</i>	35, 43	<i>neriifolia</i>	35, 39; 58, 491
<i>glabra</i>	58, 473	<i>nutans</i>	58, 492
<i>grandiflora</i>	48, 88	<i>nuttallii</i>	35, 32; 58, 475
<i>griffithii</i>	58, 491	<i>obliqua</i>	35, 34
haemantha	58, 470	<i>oblonga</i>	35, 48; 58, 504
		<i>obovata</i>	58, 507

odontocera	48, 88; 58, 478	serpens	48, 102; 58, 499
orbicularis	58, 511	serrata	48, 98
pachyacme	58, 508	setigera	35, 33
parishii	35, 31; 48, 90	sikkimense	48, 101; 58, 489
pensilis	35, 52; <i>Ic.</i> 3256;	sikkimensis	35, 29; 48, 85
	58, 509	smithiana	48, 101; 58, 489
pilifera	35, 48	spissa	35, 49; <i>Ic.</i> 3258
pottingeri	35, 47	spissiformis	58, 509
praeclara	35, 44; 58, 495	stenantha	35, 37
praestigiosa	58, 495	subcaudata	58, 503
pseudo-griffithii	35, 40; 48, 92	subvinacea	58, 500
pubiflora	35, 27; 48, 85; 58, 472	trianguli	58, 510
<i>pulcherrima</i>	58, 478	<i>unwinii</i>	35, 38; 58, 474
pyrolifolia	58, 487	variegata	48, 87, 88; 58, 477
<i>racemosa</i>	58, 476	<i>variegata</i>	35, 34-36
refracta*	58, 496	vernayana	48, 95
roylei	35, 36	<i>verticillata</i>	35, 33-36
<i>rugosum</i>	48, 99; 58, 485	<i>wallichiana</i>	35, 34
salicifolia	58, 479	wardii	58, 505
saligna	58, 477	wightianum	58, 511
saxicola	48, 92	<i>yunnanensis</i>	58, 506
scortechinii	58, 512		

Index Kewensis—a correction.—The name *Castanopsis lanceaefolia* is listed in *Index Kewensis* and attributed to 'Kurz, For. Fl. Brit. Burma ii. 482 (1877)', based upon *Quercus lanceaefolia* Roxb. Examination of Kurz's work, however, shows that he referred to the species as *Castanea lanceaefolia* (Roxb.) Kurz, a name which is listed also in *Index Kewensis*.

The *Castanopsis* synonym, again attributed to Kurz (1877), was cited by J. D. Hooker (1888) in the *Flora of British India*, in synonymy. Jackson's publication of the name in *Index Kewensis* is invalid, since he clearly indicated that it was to be regarded as a synonym of *Quercus lanceaefolia*.

The first valid publication of the name *Castanopsis lanceaefolia* was by Hickel and Camus (Bull. Soc. Bot. France 68: 394. 1922), but this was overlooked by the compilers of *Index Kewensis* because it was again attributed to Kurz (1877). Camus corrected the citation in her *Monogr. Castanea et Castanopsis* 427 (1929), but it was again omitted from the *Index Kewensis* because there was no indication of a new combination and attention was not drawn to the previous errors. The citation should be:—

Castanopsis lanceaefolia (Roxb.) Hickel et Camus in Bull. Soc. Bot. France 68: 394. 1922.—*Quercus lanceaefolia* Roxb.—A. A. BULLOCK.

A Hybrid *Dianthus* from South Africa

SHEILA S. HOOPER.

Whilst examining material of the South African species of *Dianthus*, a collection made by Dr. R. A. Dyer and Mr. J. van Breda, from Worcester Commonage, Cape Province, was found to consist of specimens of *Dianthus bolusii* Burt Davy, *D. caespitosus* Thunb. and a number of intermediate forms, presumably hybrids between these species. Hybrids between South African species of *Dianthus* do not seem to have been recorded previously though their abundance amongst North Temperate members of the genus is well known.

***D. bolusii* Burt Davy × *caespitosus* Thunb. nov. hybr.**

Type: CAPE PROVINCE; Worcester Distr.; Worcester Commonage, Karooveld on road to Cape Town; with much branched or unbranched, very variable inflorescences, Dec. 1948, Dyer 5065 × 5066 (excl. specimens referable to *D. bolusii* Burt Davy) (K, holo.; PRE, iso.).

Diagnosis: Hybrida *D. bolusii* inflorescentiis multum ramosis, *D. caespitosus* habitu caespitoso et foliorum magnitudine (3–7 cm.) persimilis. Flores quoad magnitudinem et petalorum lacinationem inter *D. bolusii* et *D. caespitosum* intermediis sunt.

Description: Glabrous glaucous somewhat caespitose perennial herb, becoming branched and woody at the base. *Vegetative shoots* few, at least at the time of flowering. *Flowering shoots* numerous, clustered, robust, mostly without elongated internodes, 2–10 cm. long, bearing an apical tuft of crowded leaves, with several axillary peduncles from the upper nodes and sometimes axillary vegetative shoots from the lower nodes; internodes generally covered by leaf sheaths, terete or obscurely angled, becoming thickened and woody; nodes swollen. *Leaves* glaucous, sometimes purple when mature, erecto-patent or spreading and recurved, linear, 3–5 cm. long, 0.05–0.1 cm. wide, widest at the base, gradually narrowing to a long slender apex, upper surface flat; nerves 5, with a broad midrib asperulent towards the base, and 2 submarginal nerves on either side; margin squamulose at base, denticulate with transparent teeth towards apex. *Peduncles* rather stout, curved or erect, sometimes unbranched (in forms approaching *D. caespitosus*), more often branched from the uppermost nodes, with 2–6 flowers; branches generally short and simple; internodes terete or sometimes obscurely angled, generally glabrous, sometimes asperulent below the nodes; bracts small erect and generally closely appressed to the stem, decreasing in size upwards; lowermost bracts $\frac{1}{3}$ – $\frac{1}{2}$ length of the corresponding internode, linear, acuminate, 3-nerved, with broadly membranous margins at the base, and short and broad sheaths twice as long as the leaf width; uppermost bracts scariosae, lanceolate-elliptic with asperulent cuspidate tips, and membranous margins. *Calyx-bracts* (2) 3 (4) pairs, appressed to the calyx and covering $\frac{1}{3}$ – $\frac{1}{2}$ its length, green yellow or tinged purple, scarious with a narrow membranous margin, striate-nervose to near base with a strong



FIG.—*Dianthus bolusii* Burt Davy $\times$ *caespitosus* Thunb.: 1, habit, $\times \frac{1}{3}$; 2, inflorescence, nat. size; 3, portion from middle of leaf-lamina showing nerves, $\times 20$; 4, leaf-sheath and node, $\times 2$; 5, calyx-bracts and calyx, $\times 2$; 6, petal, $\times 3$, with detail of claw, $\times 8$; 7, androecium (3 stamens removed) and gynoecium (showing anthophore and part of base of calyx semi-diagrammatically), $\times 2$; 8, fruit with part of calyx removed to show capsule-teeth, $\times 2$; 9, seed, $\times 10$; 10, part of seed surface, $\times c. 60$. All from Dyer & van Breda 5066.

midrib excurrent in a short apiculus; lower pairs lanceolate or elliptic-lanceolate, acuminate; upper pairs ovate-lanceolate, acute or shortly cuspidate; uppermost pair 1.0-1.5 cm. long, c. 0.5 cm. wide; anthophore 0.2 cm. long. *Calyx* green often tinged blue-purple, cylindrical or narrowing slightly towards the top, (3.2-) 3.7 (-4.0) cm. long, 0.35-0.5 cm. diameter, uniformly nerved; lobes lanceolate, abruptly narrowed at the base, cuspidate or aristate at the apex, 1.0-1.2 cm. long, 0.2 cm. wide at the base, with white membranous smooth or ciliolate margins, 5 or 7 nerves, and the midrib excurrent in a puberulent arista c. 0.1 cm. long. *Corolla*: 'petals pale pink to white' (collector's note); lamina elliptical or narrowly obovate, c. 1.0 cm. long, 0.5 cm. wide, shortly fimbriate, gradually narrowed into the wide claw; claw not exerted. *Androecium*: filaments c. 3.0 cm. long; anthers c. 0.2 cm. long. *Gynoecium*: gynophore c. 0.1 cm. long. *Capsule* cylindrical, not exerted beyond the calyx. *Seed* broadly elliptical or oblong, c. 0.3 cm. long, 0.2 cm. wide; testa regularly areolate.

The hybrid plants are characterised by a flower size, depth of laciniation of the petal-margin and degree of branching of the inflorescence intermediate between those of the parent species, (see Table below); also, in this collection at least, by short leaves, about half the length of those of *D. bolusii*, which are scabrid at the base of the midribs on the lower surface.

<i>D. bolusii</i>			
X			
	<i>D. bolusii</i>	<i>caespitosus</i>	<i>D. caespitosus</i>
no. fls./peduncle	2-12	2-6	1-4
calyx length	2.3-2.7 cm.	3.2-4.0 cm.	3.8-6.5 cm.
petal lamina {	length	c. 1.0 cm.	1.25-2.0 cm.
	breadth	c. 0.5 cm.	0.4-1.0 cm.
	margin	shortly fimbriate	crenulate or dentate

The hybrid plants appear to be fully fertile, some bearing ripe capsules, but infection by Anther Smut [*Ustilago violacea* (Pers.) Fuckel] ⁽¹⁾ has caused ovary abortion in about a quarter of the flowers examined.

Two specimens cited by Burt Davy in his account of the South African *Dianthi* ⁽²⁾ may belong to the *bolusii-caespitosus* hybrid, viz. Burchell 7295, from Swellendam Distr., which has flowers very similar to those described here for the hybrid, and Ecklon & Zeyher 243, from George or Swellendam Distr., which on the sheet kindly loaned for examination by the Chief, Division of Botany, National Herbarium, Pretoria is *D. caespitosus* whilst the Kew sheet bears a plant with a branched inflorescence and other characteristics of the hybrid.

References

- (¹) Reid & Hooper in Kew Bull. 1956: 163 (1956).
 (²) Burt Davy in Kew Bull. 1922: 218 (1922).

The genus *Cymatoderma* Jungh. (*Cladoderris*).

DEREK A. REID

The present paper contains a detailed generic description, followed by a key for the identification of the species and brief accounts of their macroscopic characters and geographical distribution. The place of publication of illustrations is indicated and the synonymy of the various taxa is as complete as possible. Microscopic data for each species may be deduced from the generic description and key.

Type specimens of most of the species have been examined, including those listed in synonymy and those which have been excluded from the genus. It has not been possible to study authentic material of taxa described by Klotzsch, as this was destroyed in the Berlin Herbarium during the last war, or to trace type material of *Cymatoderma elegans* Jungh., *Cladoderris australis* Kalchbr., *Cladoderris roccati* Mattirollo and certain other species as indicated in the text.

It is hoped to publish a monograph of the genus *Cymatoderma* elsewhere, which will include descriptions of both macroscopic and microscopic characters of each species together with text-figures.

Cymatoderma Jungh.

Cymatoderma Jungh. in Tijdschr. nat. Gesch. **7**, 290, 1840.

Synonyms:—

Cladoderris Pers. ex Berk. in Lond. J. Bot. **1**, 152, 1842—Type species *Cladoderris dendritica* (Pers.) Berk.

Actinostroma Klotzsch in Nova Acta Acad. Leop. Carol. **19** (Suppl. 1), 236, 1843—Type species *Actinostroma infundibuliforme* Klotz.

Beccariella Ces. In Atti Accad. Sci. fis. mat. Napoli **8**, 9, 1879—Type species *Beccariella insignis* Ces.

Sporophores lignicolous, coriaceous, dimidiate, flabellate, infundibuliform or pseudoinfundibuliform; adjacent fruitbodies frequently confluent. Upper surface of the pileus ornamented with radiating knife-edged ridges, which in certain species are obscured, except towards the margin, by a very thick felt-like tomentum. This tomentum may reach a thickness greatly in excess of that of the flesh of the fruitbody, whilst in other species it is much less conspicuous. Hymenial surface thrown into a complex system of folds, ridges, or undulations, and either smooth, warty, or spiny. Stipe lateral, central or pseudocentral, either well developed or reduced to a basal tubercle, tomentose. Hyphal structure dimitic or trimitic; generative hyphae frequently of two kinds (1) thin-walled, hyaline, branched, with clamp-connexions at the septa (2) very thick-walled with the lumina often obliterated, subhyaline, less freely branched, with clamp-connexions at the septa; skeletal hyphae very thick-walled with the lumina obliterated, hyaline, sub-

hyaline, or pale brown, unbranched, lacking clamp-connexions, and tapering to very elongated, narrow, obtuse apices; binding hyphae thick-walled, with numerous branches of limited growth, lacking clamp-connexions. Cuticle present or absent. Surface tomentum formed of elongated, thick-walled hyphae with narrow lumina, which are unbranched and bear clamp-connexions at intervals throughout their entire length. Hymenium thickening. Cystidia present in some species as apically encrusted metuloids, varying in shape from clavate, obpyriform or lanceolate to subglobose. These bodies, which are found at any level in the thickened hymenium, arise from thin-walled generative hyphae to which they are joined by a clamp-connexion. When present in the current functional hymenial layer they have very slightly thickened walls and project beyond the basidia, but as the hymenium thickens they become buried and develop very strongly thickened walls. The encrusting substance which covers the apices of these organs is soluble in 10 per cent potassium hydroxide solution, but may be readily seen in mounts made in aniline blue in lactic acid. Gloeocystidia present in all species as long, deeply staining, thin-walled bodies with highly refractive contents, having distinctly swollen bases and narrowing above to obtuse apices. They may be constricted at intervals and appear moniliiform, rarely project beyond the basidia, and seldom more than 5–10 μ . These organs like the cystidia, originate from thin-walled generative hyphae to which they are united by a basal clamp-connexion, and may be produced at any level in the hymenium. However, as they are of potentially unlimited growth many gloeocystidia traverse the total width of the hymenium, although others become buried as the hymenium thickens and cease to grow. The gloeocystidia of the first formed hymenial layer usually originate in the trama just above the hymenium but sometimes deep in this tissue. In species possessing both cystidia and gloeocystidia the relative numbers of these two types of organ vary in inverse proportion. Basidia clavate, usually 4-spored. Spores thin-walled, hyaline, nonamyloid, varying in shape from broadly elliptical to subglobose, narrowly elliptical to subcylindrical or broadly elliptical to elliptical.

Type species: *Cymatoderma elegans* Jungh.

The species belonging to this genus fall naturally into two sections according to their hyphal structure and spore characters. These sections may be characterized as follows:—

Cymatoderma Jungh. section *Cymatoderma*

Hyphal structure dimitic. Cuticle present or absent. Metuloids present in some species. Spores narrowly elliptical to subcylindrical or broadly elliptical to elliptical.

Type species:—*Cymatoderma elegans* Jungh.

Other species:—*C. blumei* (Lév.) Reid; *C. caperatum* (Berk. & Mont.) Reid; *C. plicatum* (Lloyd) Reid; *C. sclerotoides* (Lloyd) Reid.

Cymatoderma Jungh. section *Cladoderris* (Pers. ex Berk.) Reid, stat. nov.

Hyphal structure trimitic. Cuticle absent. Metuloids normally absent. Spores minute, very broadly elliptical to subglobose, (2.5–) 3–4 $\times$ (2–) 2.5–3 μ .

Type species: *Cymatoderma dendriticum* (Pers.) Reid

Other species:—*C. fuscum* (Cooke) Reid

Since the generic name *Cladoderris* had become universally accepted for these fungi it was proposed by Donk (in Bull. bot. Gdns. Buitenzorg Series III, 17, 156, 163, 1941), as a nomen conservandum against the earlier name *Cymatoderma* which had, hitherto, been applied to only one species. This proposal was rejected by ballot of the Special International Committee for Fungus Nomenclature (Taxon 2, 31, 1953; Mycologia 45, 320, 1953). In view of the knowledge of this group then available, the Committee's decision seemed hard to justify, but the results of the present investigation would seem to indicate that it was correct. It has been shown that there are two distinct groups of species within the genus previously known as *Cladoderris*, and that one group contains the type species of *Cymatoderma* and the other the type species of *Cladoderris*. It is therefore possible that, although the differences between these two groups of species have not been considered sufficient to warrant the recognition of two genera in this study, other workers may, with some justification, prefer to maintain both *Cladoderris* and *Cymatoderma* as distinct genera.

Members of the genus *Cymatoderma* may be distinguished from all other stipitate stereoid fungi by the presence of a very well developed, often felt-like, tomentum formed of thick-walled hyphae which bear clamp-connexions at the septa throughout their entire length, the surface of the pileus being ornamented with conspicuous radiating knife-edged ridges (often obscured, except towards the margin, by the tomentum) and the hymenial surface being thrown into a complex system of radiating, branched folds which may be covered with densely crowded warts or spines in certain species.

Key to species.

- [A] Hyphal structure dimitic; cuticle present or absent; metuloids present in some species; spores narrowly elliptical to subcylindrical or broadly elliptical to elliptical (*Cymatoderma* section *Cymatoderma*) B
- [B] Spores narrowly elliptical to subcylindrical C
- [C] Thick-walled apically encrusted metuloids present; spores $5-7 \times 2-3\mu$; sporophores dimidiate or flabellate; hymenial surface thrown into a complex system of densely crowded, radiating, dendroid ribs which are united behind into 'main branches' and finally into a 'trunk' or stipe; known only from Java, Malaya and the Philippine Islands *C. blumei* (Lév.) Reid
- [C] Metuloids absent; hymenial surface not thrown into dendroid ribs D
- [D] Spores $(3.5-4.5) 4-5.5 \times 2-3\mu$; sporophores infundibuliform, arising from a large dark-brown, strongly ribbed and wrinkled sclerotium; tomentum of the upper surface of the pileus deep rich ochre-brown; hymenial surface thrown into numerous undulating radial folds; known only from Brazil
C. sclerotiioides (Lloyd) Reid
- [D] Spores $7.5-12 \times 2.5-4.5\mu$; sporophores normally infundibuliform, but not arising from a sclerotium; tomentum of the upper surface of the pileus fawn; hymenial surface thrown into broad

undulating radial folds; known only from the tropical and sub-tropical regions of the New World

C. caperatum (Berk. & Mont.) Reid

- [B] Spores broadly elliptical to elliptical; thick-walled apically encrusted metuloids present E

- [E] Spores (6-) 6.5-9 $\times$ (3.5-) 4-5 μ ; sporophores dimidiate, flabellate, infundibuliform or pseudoinfundibuliform; hymenial surface radiately folded or thrown into conspicuous branching ribs which may or may not bear warts or spines . . . *C. elegans* Jung.

- [F] Sporophores dimidiate or flabellate, rarely pseudoinfundibuliform; hymenial surface thrown into branched radial folds which bear numerous warts or spines; known from Africa, Asia and certain Pacific Islands *C. elegans* var. *elegans*

- [F] Sporophores normally pseudoinfundibuliform; hymenial surface thrown into rather broad obtuse radiating folds which are devoid of warts and spines; known only from Australasia

C. elegans var. *lamellatum* (Berk. & Curt.) Reid

- [E] Spores (7.5-) 8-11 $\times$ 4-5.5 μ ; sporophores pseudoinfundibuliform; hymenial surface thrown into rather broad obtuse radiating folds which are devoid of warts and spines; known only from Australia

C. plicatum (Lloyd) Reid

- [A] Hyphal structure trimitic; cuticle absent; metuloids normally absent; spores minute, very broadly elliptical to subglobose (*Cymatoderma* section *Cladoderris*) G

- [G] Surface tomentum of the pileus varying in colour from beige to fawn, often with ochraceous tints; hymenial surface thrown into a complex system of densely crowded, rather sharp, radiating, branched ribs, which are not united into 'main branches' and 'trunks' (as in *C. blumei*), but may bear scattered or densely crowded spines in a minority of collections; spores (2.5-) 3-4 $\times$ (2-) 2.5-3 (-3.5) μ ; pantropical but especially frequent in S. America

C. dendriticum (Pers.) Reid

- [G] Surface tomentum of the pileus tawny-brown; hymenial surface thrown into conspicuous folds or short ribs, which are densely covered with minute granules; subhymenial tissue consisting of hyphae which are strongly encrusted with a granular deposit which is soluble in 10 per cent potassium hydroxide solution; metuloids absent *C. fuscum* (Cke.) Reid

- [H] Spores 3.75-4 $\times$ 2.5-2.75 μ , known only from Brazil

C. fuscum var. *fuscum*

- [H] Spores 3-3.5 $\times$ 2-2.5 μ , known only from Florida

C. fuscum var. *floridanum* (Lloyd) Reid

***Cymatoderma blumei* (Lév.) Reid, comb. nov.**

Synonym:

Cladoderris blumei Lév. in Ann. Sci. nat. Series III, 2, 213, 1844.

Sporophores 3–10 cm. from stipe to margin, 2–11.5 cm. in width, thin, pliable, coriaceous-membranous, dimidiate or flabellate, with very short lateral stipes; adjacent fruitbodies frequently becoming confluent, forming brackets up to 15 cm. in width, with the lines of fusion marked on the upper surface by a knife-edged crest. *Pileus* dark-brown or dark-purplish-rusty-brown, often obscurely zoned, appearing almost glabrous or minutely tomentose especially towards the stipe, and ornamented with conspicuous densely crowded radiating knife-edged crests. *Hymenial surface* thrown into a striking and characteristic system of radiating ribs, united behind into prominent 'main branches' up to 1 cm. in width, which diverge from the stipe. The ultimate ribs run out freely giving the margin a fringed appearance. The 'main branches' are often cream coloured and contrast with the general purple-grey or purplish-ochraceous-buff of the remainder of the lower surface. *Stipe* lateral, short and stout, often reduced to a basal tubercle, covered by a thick ochraceous tomentum. *Flesh* white or cream coloured, very thin.

Distribution: Java, Malaya and the Philippine Islands.

Illustrations

Lloyd, C. G. (1925) *Mycological Writings* 7, Pl. 322 fig. 3086.

Cymatoderma caperatum (Berk. & Mont.) Reid in Kew Bull. 1955, p. 635, (published 1956).

Synonyms:

Thelephora caperata Berk. & Mont. in Ann. Sci. nat. Series III, 11, 241, 1849.

Stereum caperatum (Berk. & Mont.) Berk. in J. Linn. Soc. (Bot.) 18, 385, 1881.

Cladoderris caperata (Berk. & Mont.) Pat. in Essai Taxonomique sur les Hyménomycètes p. 73, 1900.

Stereum goliath Speg. in Ann. Soc. Cien. Argentina 17, 77, 1884.

Stereum hylocrater Speg. in Ann. Soc. Cien. Argentina 17, 77, 1884.

Stereum hydrophorum Berk. var. *hylocrater* (Speg.) Masee in J. Linn. Soc. (Bot.) 27, 160, 1890.

? *Thelephora tuberosa* Speg. [nec. Fries] in Ann. Mus. nac. Buenos Aires 19, 276, 1909.

Sporophores 4–19 cm. high, 2.2–12 cm. wide, thin, pliable, coriaceous-membranous, normally infundibuliform, with central stipe; adjacent fruit-bodies frequently becoming confluent. *Pileus* straw-coloured, golden- or rusty-brown (sometimes very dark brown in old herbarium specimens but probably due to treatment with mercuric chloride), ornamented with radiating knife-edged ridges, which are often obscured, except toward the margin, by the development of a very thick, dirty fawn, felt-like tomentum. *Hymenial surface* creamy white to flesh colour in the living fungus, becoming rusty-cream or ochraceous-cream with a pinkish tinge in dried specimens or even dark purplish-brown in sporophores which have been poisoned with mercuric chloride. The surface is thrown into obtuse radiating folds which tend to branch toward the margin. *Stipe* central, frequently very short or

rudimentary, but sometimes well developed, covered by a brownish tomentum and attached to the substrate by a small basal disc.

Distribution: contrary to records in the literature, this species seems to be confined to the tropical and subtropical regions of the New World (see Reid 1956).

Illustrations:

Burt, E. A. (1920). 'The Thelephoraceae of North America. Stereum' in *Ann. Mo. bot. Gdn* **7**, Pl. 2, fig. 1.

Lloyd, C. G. (1913). 'Synopsis of the stipitate Stereums', in *Mycological Writings* **4**, fig. 531.

Teixeira, A. R. (1945). 'Himenomicetos Brasileiros. II' in *Bragantia* **5**, Pl. 7.

***Cymatoderma dendriticum* (Pers.) Reid, comb. nov.**

Synonyms:

Thelephora dendritica Pers. in Gaudichaud, *Voyage sue l'Uranie*. Botany, p. 176, 1826.

Cladoderris dendritica (Pers.) Berk. in Hooker's *Lond. J. Bot.* **1**, 152, 1842.

Actinostroma crassum Klotzsch in *Nova Acta Acad. Leop. Carol.* **19** (Suppl. 1), 237, 1843.

Cladoderris crassa (Kl.) Fr. in *K. svenska VetenskAkad. Handl.* **69**, 142, 1849 [preprint 1848].

Cladoderris candolleana Lév. in *Ann. Sci. nat., Series III*, **5**, 153-154, 1846.

Beccariella trailii Cooke in *Grevillea* **20**, 33, 1891.

Cladoderris trailii (Cooke) Lloyd in 'Synopsis of the genus *Cladoderris*' p. 5 in *Mycological Writings* **4**, 1913.

Cladoderris imbricata Pat. in *Bull. Soc. mycol. Fr.* **38**, 86-7, 1922.

Stereum fenixii Lloyd in *Mycological Writings* **7**, 1115, 1922.

Also the following manuscript names on specimens in the Kew Herbarium but quoted by Lloyd (1913) in the synonymy of this species:—

Cladoderris brasiliensis Fries

Stereum flabellatum Massee

Stereum harrisii Massee

Sporophores up to 10.5 cm. from stalk to margin, and 20.5 cm. in width, thin, pliable, coriaceous-membranous, dimidiate or flabellate, often deeply lobed, sometimes almost to the short lateral stipe, and the lobes when numerous becoming imbricate. *Pileus* usually completely covered by a very well developed felt-like tomentum which often greatly exceeds the thickness of the flesh and may reach 8 mm. near the base of the fruitbody, obscuring the knife-edged ridges on the surface of the pileus which in this species are rather short and not very prominent. In herbarium material this tomentum varies in colour from dull beige or pale fawn to quite dark ochraceous-brown, but collectors notes indicate that the upper surface of the living plant may be fawn, cinnamon-fawn, subferruginous, or dark brown, frequently

with paler or faint rufescent zones becoming rufescent-brown or fuscous brown toward the base of the sporophore and whitish toward the laccerate-spiculose margin. *Hymenial surface* cream-coloured in well preserved young fruitbodies to purplish- or reddish-brown in older specimens, but livid grey, fawn-drab, brownish-tan, or whitish becoming pale-brown or ochraceous fawn in fresh material. The surface is thrown into a complex, but highly characteristic, system of densely crowded, rather sharp, branched, radiating ribs which are not united behind into 'main branches'. It would seem that in living fructifications the ribs may be more obtuse than in dried specimens and may in addition bear warts or spines. These usually disappear on drying, but persist in some instances, as in the type specimen of *Beccariella trailii* where the hymenial surface is covered with spines. *Stipe* lateral, usually short and stout or rudimentary, rarely well developed as in the type specimen in which it reaches 5 cm. in length and 1.5 cm. in width, covered by a dense reddish-brown tomentum. *Flesh* thin, greyish-white to pallid wood colour.

Distribution: Pantropical, but particularly frequent in South America.

Illustrations:

Burt, E. A. (1924). 'The Thelephoraceae of North America. *Cladoderris*', in Ann. Mo. bot. Gdn **11**, Pl. 1, fig. 1.

Lloyd, C. G. (1913). 'Synopsis of the genus *Cladoderris*' in Mycological Writings **4**, figs. 521 [photograph of the type specimen of *Thelephora dendritica*]; 522 [photograph of the type specimen of *Actinostroma crassum*]; 523; 524 [photograph of the type specimen of *Beccariella trailii*].

Teixeira, A. R. (1945). 'Himenomicetos Brasileiros. II' in Bragantia **5**, Pl. 16.

***Cymatoderma elegans* Jungh.** in Tijdschr. nat. Gesch. **7**, 290, 1840.

Synonyms:

Cladoderris elegans (Jungh.) Fr. in K. svenska VetenskAkad. Handl. **69**, 142, 1949 [preprint 1848].

Thelephora caperata forma *elegans* (Jungh.) P. Henn. 'Fungi' in De Wildeman Mission E. Laurent, 537, 1907.

Cladoderris spongiosa Fr. in K. svenska VetenskAkad. Handl. **69**, 140-141, 1849 [preprint 1848].

Beccariella insignis Ces. in Atti. Accad. Sci. fis. mat. Napoli **8**, p. 9-10 of reprint, 1874.

Cladoderris australica Berk. apud Sacc. in Sylloge Fungorum **6**, 548-549, 1888.

Beccariella kingiana Masee in Grevillea **20**, 33, 1891.

Cladoderris scrupulosa Lloyd in 'Synopsis of the genus *Cladoderris*', p. 8 in Mycological Writings **4**, 1913.

Cladoderris roccati Mattirollo in Ann. Bot. Roma **7**, 144-145, 1908, and also in Il Ruwenzori relazioni scientifiche **1**, p. 14-17 of reprint, 1909.

Sporophores up to 13 cm. from stalk to margin, and 14 cm. in width, coriaceous, dimidiate, flabellate or pseudoinfundibuliform, with short

lateral or long pseudocentral stipe; adjacent fruitbodies frequently becoming confluent. *Pileus* often completely covered by a thick felt-like tomentum which obscures the underlying radiating knife-edged ridges on the surface of the sporophore, although their presence is frequently indicated by striking rugosity. The tomentum in herbarium material varies in colour from fawn, often with brown or ochraceous tones, to tawny brown or snuff-brown in ancient collections. *Hymenial surface* varying from beige, ochraceous-beige or pinkish-brown to ochraceous brown (rarely dark purplish brown in very old material), and ornamented with rather prominent, branched, radiating folds which bear scanty or densely crowded warts or spines. The hymenial folds tend to be united behind into 'main branches' which radiate from the stem. Stipe up to 5 cm. long, 0.8 cm. wide, covered by a thick fawn or brown felt-like tomentum. In dimidiate or flabellate sporophores the stipe is short or rudimentary but it tends to be well developed in fruitbodies which are pseudoinfundibuliform. *Flesh* pallid wood colour.

Distribution: tropical Africa and Asia, and certain Pacific Islands.

Illustrations:

Cesati, V. (1874). 'Mycetum in itinere borneensi lectorum a cl. Od. Beccari' in *Atti Accad. Sci. fis. mat. Napoli* **8**, Pl. 4 [as *Beccariella insignis*—presumably portraying the type specimens].

Cooke, M. C. (1892). 'Handbook of Australian fungi', Pl. 11, fig. 76 [as *Cladoderis australica*—a schematic drawing of the neotype of this species].

Junghuhn, F. W. (1840). 'Nova genera et species plantarum florae Javanicae' in *Tijdschr. nat. Gesch.*, Pl. 8, fig. 10 [portraying the type specimen of *Cymatoderma elegans*].

Lloyd, C. G. (1913). 'Synopsis of the genus *Cladoderis*' in *Mycological Writings* **4**, fig. 525 [as *C. elegans*]; fig. 526 [as *C. spongiosa*—part of the type material in Herb. Fries]; fig. 528 [as *C. infundibuliformis*—this is part of the collection selected as neotype of *C. australica*].

Mattirolo, O. (1909). 'Il Ruwenzori relazioni scientifiche' **1**, Pl. 2 [as *Cladoderis roccati*—presumably portraying the type specimen].

Var. lamellatum (Berk. & Curt.) Reid, comb. nov.

Synonyms:

Thelephora lamellata Berk. & Curt. in *Amer. J. Sci.*, Series II, **11**, 94, 1851.
Stereum caperatum var. *lamellatum* (Berk. & Curt.) Cooke in 'Handbook of Australian Fungi', p. 182, 1892.

Cladoderis lamellata (Berk. & Curt.) Pat. in *Essai taxonomique* p. 73, 1900.

Stereum lamellatum (Berk. & Curt.) Wakefield in Sarasin and Roux 'Nova Caledonia', Botany, **1**, 100, 1920.

Cymatoderma lamellatum (Berk. & Curt.) Reid in *Kew Bull.* **1955**, p. 631 [published 1956].

Stereum spongiaepes Berk. in *J. Linn. Soc. (Bot.)* **18**, 385, 1881.

Thelephora spongiaepes (Berk.) Berk. & Broome in *Trans. Linn. Soc. Lond.* Series II, **2**, 63, 1883.

Stereum caperatum var. *spongiaepes* (Berk.) Cooke in 'Handbook of Australian Fungi', p. 182, 1892.

Cladoderris caperata var. *spongiaepes* (Berk.) Reinking in Philipp. J. Sci. **17**, 366, 1920.

? *Cladoderris australis* Kalchbr. apud de Thuemen in Flora **61**, 441, 1878.

Sporophores usually large, up to 18 cm. high, and 30 cm. wide, coriaceous, pseudoinfundibuliform or perhaps even truly infundibuliform, usually with a well developed pseudocentral stipe which is covered by a thick felt-like tomentum, although in some collections it is short or rudimentary; adjacent fruitbodies sometimes confluent. *Pileus* as in var. *elegans*. *Hymenial surface* thrown into rather broad, obtuse, radiating folds which are less branched toward the margin of the fructification than in the type variety, and devoid of warts or spines.

Distribution: known only from Australasia.

Illustrations:

Berkeley, M. J. (1862). 'United States exploring expedition during the years 1838-1842 under the command of Charles Wilkes, U.S.N. **17**, Pl. 1, fig. 7 [portraying the type specimen of *Thelephora lamellata*].

Berkeley, M. J. & Broome, C. E. (1883). 'A list of the fungi from Brisbane, Queensland' in Trans. Linn. Soc. Lond., Series II, **2**, Pl. 14, figs. 1 & 2 [as *Thelephora spongiaepes*].

Lloyd, C. G. (1918). 'Mycological Notes No. 56' in Mycological Writings **5**, fig. 1256 [as *Stereum spongiaepes*].

Cymatoderma fuscum (Cooke) Reid, comb. nov.

Synonyms:

Cladoderris fusca Cooke in Grevillea **10**, 123, 1882.

Cladoderris glaziovii P. Henn. in Bot. Jb. **15**, Beib. No. 34, p. 15, 1892.

Sporophores 3-6 cm. from stipe to margin, and 4-10 cm. in width, coriaceous, dimidiate or flabellate, and reduced behind to a broad attachment area. *Pileus* covered by a thick tawny-brown felt-like tomentum which obscures the short radiating, inconspicuous ridges on the surface of the fruit-body, except towards the very dark brown or black, glabrous, shining margin. *Hymenial surface* pinkish beige with a purplish tinge; thrown into several main radiating folds which pass laterally and terminally into innumerable small diverging ridges. The whole surface is covered with very minute granular protuberances. *Stipe* rudimentary. *Flesh* pale brown.

Distribution: Rio de Janeiro, Brazil [known only from the type gathering].

Illustrations: None.

Var. **floridanum** (Lloyd) Reid, comb. nov.

Synonym:

Cladoderris floridana Lloyd in Mycological Writings **4**, Letter No. 47, p. 15, 1913.

Sporophores: The type collection consists of five fruitbodies, of which three are flabelliform and two pseudoinfundibuliform. One of these funnel-

shaped fructifications has been formed by fusion from a flabellate structure. The fusion has not occurred along the free margins of the pileus but where the incurving surfaces happened to meet and is incomplete at the base. As a result one of the free margins has curled round to form a lobe within the funnel-shaped sporophore. The remaining pseudofundibuliform structure is a compound fructification formed by confluence of two sporophores in their upper portions. Here again fusion is incomplete and has not occurred along the free margins of the pilei, which have curled round within the funnel and fused with each other in a complicated manner. One of the flabellate fruit-bodies is evidently compound and has been formed from two or more imbricate sporophores which have become confluent along one margin. *Pileus* covered by a thick tawny-brown felt-like tomentum which thins out toward the margin where the concentric undulations of the surface often appear as distinct zones owing to weathering. In old specimens the brown, radiately wrinkled surface of the pileus may be exposed in concentric bands. The margin of some sporophores is shiny and either very dark brown or black, but in others, presumably where there is active marginal growth, this dark zone is covered by a thin whitish or cream coloured web of hyphae. *Hymenial surface* tawny-brown, often with a greyish bloom, and thrown into short inconspicuous radial undulations except towards the margin where they are usually much more pronounced and ridged. Again with the exception of the marginal zone the hymenial surface is densely covered by very small granular excrescences, scarcely visible to the naked eye. *Stipe* the pileus is narrowed behind into a very short stipe, 0.2–1 cm. in length, down which the hymenium extends, sometimes almost to the base. The surface is covered by a thick tawny tomentum. Flesh pale brown.

Cymatoderma fuscum var. *floridanum* would seem to differ from var. *fuscum* in its more variable growth form and slightly smaller spores. However, it is extremely probable that, with further collections, these rather small distinctions will be found to represent the range of variation within a single taxon.

Distribution: Florida, U.S.A. [known only from the type gathering].

Illustrations:

Burt, E. A. (1924). 'The Thelephoraceae of North America. Cladoderris', in Ann. Mo. bot. Gdn 11, Pl. 1, fig. 1 [part of the type collection].

Lloyd, C. G. (1915). 'Mycological Notes No. 39', fig. 734, in Mycological Writings 4 [photograph of part of the type collection].

***Cymatoderma plicatum* (Lloyd) Reid, comb. nov.**

Synonym:

Stereum plicatum Lloyd in Mycological Writings 5, Mycological Notes No. 56, p. 807, 1918.

Sporophores 7.5–10 cm. (fide Lloyd 1918). The type specimen is a compound fructification with two stipes fused together and a third which is free except toward the base. These stipes expand above into an irregularly lobed, pseudofundibuliform pileus. *Pileus* surface ornamented with conspicuous radiating ridges which are partly concealed beneath a thick ochraceous-brown tomentum. This felty covering is paler toward the centre.

Hymenial surface pale creamy-ochre; thrown into broad (up to 1 cm.) radial, branching folds which are devoid of warts or spines. *Stipe* 4 cm. in length, well developed and covered by a thick, ochraceous brown tomentum.

This species is extremely closely related to *Cymatoderma elegans* var. *lamellatum* (Berk. & Curt.) Reid, differing only in its slightly larger spores. However, examination of further collections is required before taking a final decision on the status of this fungus.

Distribution: Sydney, Australia [known only from the type gathering].

Illustrations: None.

***Cymatoderma sclerotoides* (Lloyd) Reid, comb. nov.**

Synonym:

Stereum sclerotoides Lloyd in Mycological Writings 7, 1115, 1922.

Sporophores 7·75 cm. high, 2·5 cm. wide, arising from a very hard, dark brown, strongly ribbed and wrinkled sclerotium which is 4 cm. long and 2·5 cm. in width. The well developed stipe expands above into a small, coriaceous, infundibuliform pileus, 1·75 cm. high and 2·5 cm. in diam., with wavy margin. *Pileus surface* ornamented with slight radial ridges which are covered by a thick, deep rich ochre-brown tomentum. *Hymenial surface* pale creamy-ochre; thrown into numerous radial folds. *Stipe* 6 cm. in length and 1 cm. in width at the base, but narrowing toward the apex before expanding into the pileus. The surface is covered by a thick, spongy, deep ochre-brown tomentum.

Distribution: Brazil [known only from the type gathering].

Illustrations:

Lloyd, C. G. (1922). 'Mycological Notes No. 66' in Mycological Writings 7, Pl. 197 figs. 2104 & 2105 [photographs of the type specimen].

Species which are insufficiently known.

***Cladoderris formosa* Lév. in Ann. Sci. nat. Series III, 2, 214, 1844.**

The species was described from a specimen in the Leiden Herbarium, which was stated by Lévillé to be almost entirely eaten by insects. It can no longer be traced in that Institution.

From the original description it is only possible to conclude that the fungus was a species of *Cymatoderma*.

***Actinostroma infundibuliforme* Klotzsch in Nova Acta Acad. Leop. Carol. 19 (Suppl. 1), 237, 1843.**

Synonym:

Cladoderris infundibuliformis (Kl.) Fr. in K. svenska VetenskAkad. Handl. 69, 141, 1849 [preprint 1848].

The type specimen of this species was destroyed in the Berlin Herbarium during the last war. However, Lloyd (see below) published photographs of what he stated were the type specimens from the Klotzsch Herbarium. These show two sporophores, one clearly spathulate and the other pre-

sumably infundibuliform. The upper surface of the pileus appears to be ornamented with radiating knife-edged ridges, and seems to be almost glabrous, while the lower surface is thrown into closely crowded, branched, radiating folds which are united behind into rather indistinct 'main branches'. The hymenial surface is devoid of warts or spines.

Clearly this fungus is a species of *Cymatoderma*. It may be a distinct species, but as yet there is insufficient microscopic data available upon which to base an opinion.

Distribution: this fungus has been reported on a number of occasions from the Philippine Islands, which is the type locality. It has also been stated to occur in other countries, but as the name *C. infundibuliformis* has been loosely applied to any infundibuliform *Cladoderris* spp. from Africa, Asia or Australasia, such records are worthless.

Illustration:

Lloyd, C. G. (1913). 'Synopsis of the genus *Cladoderris*', figs. 527 and 529 in *Mycological Writings* 4 [photographs of the type].

Cladoderris schumanniana P. Henn.—'Fungi' in Schumann & Hollrung 'Die Flora von Kaiser Wilhelms Land', p. 6, 1889.

The type specimen of this species was destroyed in the Berlin Herbarium during the last war. From the original description it seems doubtful whether Henning's fungus was a true *Cladoderris*.

Excluded species.

Beccariella caespitosa Cooke in Grevillea 9, 100, 1881 [published in error as *Beccaria caespitosa*].

This is typical *Polyporus fimbriatus* Fr.

Cladoderris cartilaginea Massee in Bull. Misc. inf. Kew (Kew Bull.) 1899, p. 172.

This is not a *Cladoderris*, but a stipitate stereoid fungus.

Cladoderris funalis P. Henn. in Bot. Jb. 38, 120, 1905.

This is undoubtedly a member of the Clavariaceae, belonging to the genus *Aphelaria* Corner. The new combination in this genus is hereby proposed:—

Aphelaria funalis (P. Henn.) Reid, comb. nov.

Cladoderris gausapata (Fr.) Fr. in K. svenska VetenskAkad. Handl. 69, 142, 1849 [preprint 1848].

Synonyms:

Telephora gausapata Fr. in Elenchus Fungorum 1, 171, 1828.

Stereum gausapatum (Fr.) Fr. in Hymenomycetes Europaei 638, 1874.

This is now universally taken to be a member of the genus *Stereum* sensu stricto.

Cladoderris membranacea *De Vries & Lévillé* in Ann. Sci. nat. Series III, 5, 153, 1846.

This is not a *Cladoderris*, but an effuso-reflexed stereoid fungus.

Cladoderris minima *Berk. & Broome* in Ann. Mag. nat. Hist. Series V, 1, 24, 1878.

Synonym:

Stereum minimum (Berk. & Br.) Lloyd in Mycological Writings 4. 'Synopsis of the stipitate Stereum', p. 36, 1913.

This is *Corticium laeve* forma *cucullata* Bourd. & Galz.

Cladoderris mussooriensis *P. Henn.* in Hedwigia 40, 324, 1901.

This is not a *Cladoderris*, but a stipitate stereoid fungus.

Cladoderris platensis *Speg.* in Ann. Mus. nac. Buenos Aires 6, 179, 1899.

This is a species of *Merulius*, which is probably synonymous with *M. sordidus* Berk. & Curt.

Cladoderris pritzelii *P. Henn.* in Hedwigia 42, p. (74), 1903.

This is *Lopharia papyracea* (Jungh.) Reid

Cladoderris rickii *Lloyd* in Mycological Writings 7, 1196, 1903.

This is a species of *Merulius*, which is probably synonymous with *M. sordidus* Berk. & Curt.

Cladoderris thwaitesii *Berk. & Br.* in J. Linn. Soc. (Bot.) 14, 63, 1873.

Synonym:

Stereum thwaitesii (Berk. & Br.) Petch. in Ann. Roy. Bot. Gdns Peradeniya 9, 134, 1924.

This is *Stereum radicans* (Berk.) Burt

References

Lloyd, C. G. (1913). 'A synopsis of the genus *Cladoderris*', p. 10-11, in Mycological Writings 4.

Reid, D. A. (1956). 'New or interesting records of Australasian Basidiomycetes' in Kew Bull. 1955, p. 635.

Notes on Gymnosperm Nomenclature

R. MELVILLE

While revising the Kew 'Handlist of Coniferae' the need for several new combinations became apparent and it has been found necessary to comment on certain name changes that have been proposed in the literature. The following notes deal with the more important points that have come to my notice.

THE GIANT FIR AND THE CASCADE FIR

The suggestion that the names *Abies grandis* and *A. amabilis* were misapplied to the two trees that normally bear them was put forward by Little in some 'Notes on nomenclature in *Pinaceae*' (Amer. J. Bot. **31**, 591, 1944). Later, Franco accepted this suggestion and acted upon it, proposing a new name, *A. excelsior* for the Giant Fir and transferring the name *A. grandis* to the Cascade Fir. Such a name change would be deplorable, if it were necessary and would, in any case, render the application of the name *A. grandis* doubtful. In such circumstances it would be far preferable, but illegitimate, to propose new names for both species and not for one only. Fortunately, the argument in support of these name changes is faulty in several particulars.

The earliest description of either plant is that of *Pinus grandis* D. Don ex Lambert, Genus Pinus, ed. 2. 1832, which appeared on one of the supplementary pages not present in all copies of this work. The rather short description which was based on specimens collected by Douglas, is not precise enough to enable a decision to be made as to the possibility of a mixture, but the bract scales of the cones, '*bracteolae*', are said to be ovate-acuminate. This suggests an admixture of the Cascade Fir with the Giant Fir. In the third edition of the Genus Pinus (t. 100, 1837) a figure was given, which clarifies the question. The spray of foliage shows clearly the pectinate arrangement of the leaves in the Giant Fir. The coning spray might be assigned to either species, but the cone scales depicted are those of the Cascade Fir. Don's description, therefore, applied to a mixture; possibly he did not consider the two species sufficiently distinct to be separated.

It was open to the first author discriminating between the two species to assign the epithet '*grandis*' to one component of the mixture. Lindley (Penny Cycl. **1**, 30, 1833) took up the epithet under *Abies* citing Douglas and Lambert. The short description that he provided included one critical feature that leaves no doubt that he must have examined Douglas' material for himself and had correctly linked up the cones with the foliage specimens. Lindley's description of the bract scales: 'bracteae very short, jagged, two lobed with a short intermediate point' can apply only to the Giant Fir. His description is consistent and therefore the correct name for the giant fir is *Abies grandis* (Don ex Lambert) Lindley.

An examination of other literature of the period indicates that this conclusion is right. Both Loudon and Forbes had access to Douglas' specimens. Loudon (Arb. & Frut. Brit. **4**, 2341-2, 1838) assigned the plants to

Picea. He was confused by Don's initial mistake and commented upon the inconsistencies arising from it. Under *Picea grandis* Loudon copied from Lambert the figures of the foliage and the cone (fig. 2245), but he also shows another cone with the cone scales of the giant fir. Although one of the cones illustrated may be wrongly assigned, the foliage and the cone scales are those of the Giant Fir and indicate correctly which species Douglas had called *Pinus grandis*. Loudon completed his account with a repetition of Don's description, leaving the errors uncorrected. Loudon's description and figures of *Picea amabilis* are a consistent presentation of the Cascade Fir, bearing in mind that he was describing a coning branch bearing leaves with apices entire or acute.

Forbes (*Pinetum Woburnense*) states in his preface that he had examined Douglas' specimens. His figures for the Giant Fir (t. 43), as *Abies grandis* and the Cascade Fir (t. 44), as *A. amabilis* are both botanically correct. The description of *A. grandis* is influenced by that of Don, but the figure leaves no doubt that he had correctly identified the Giant Fir. That Forbes made no reference to Loudon under *A. amabilis* was due to the fact that the two authors were writing concurrently and independently. Although Forbes' book was published a few months later than Loudon's, there is no reason to regard his binomial as a new combination. It was based directly on Douglas' specimens. The name of the Cascade Fir should therefore be cited as *Abies amabilis* Forbes.

When Andrew Murray (*Proc. Hort. Soc.* 308, 1863) came to study the application of these names, the position was clouded by the dispersal and presumed loss of Douglas' specimens and the introduction of seeds of other species under the name *A. amabilis*. After Douglas' original introduction in 1831, no more correctly identified seed of *A. amabilis* was imported into England until Engelmann, Parry and Sargent rediscovered the tree in 1880. It appears that Murray failed to realise that Don had confused the two species in Lambert's Genus *Pinus* and his argument that the names should be applied in the reverse order from that intended by Douglas cannot be accepted, as Lindley (*Penny Cycl.* 1, 30) had made the correct choice in selecting one element only of the mixture, when he made the combination *A. grandis*.

The essential synonymy is as follows:

GIANT FIR

Pinus grandis D. Don in Lambert, Genus *Pinus* 2 suppl. (1832); 3 t. 100 (1837), pro parte, quoad fol.

Abies grandis (*Don ex Lambert*) Lindl. in Penny Cycl. 1, 30 (1833); Forbes, *Pinet. Woburn.* 123, t. 43 (1839).

Picea grandis (*Don ex Lambert*) Loud. in Arb. et Frut. Brit. 4, 2341, f. 2246 (1838).

[*Abies amabilis* A. Murr. in *Proc. Hort. Soc. Lond.* 3, 310 (1863), non Forbes].

A. excelsior Franco in Bol. Soc. Brot. 23, 162 (1949), nomen superfluum.

CASCADE FIR

Pinus grandis D. Don in Lambert, Genus *Pinus* 2, suppl. (1832); 3, t. 100 (1837), pro parte, quoad bract. strob.

Picea amabilis Dougl. ex Loud. in Arb. et Frut. Brit. 4, 2342, f. 2248 (1838).

Abies amabilis Dougl. ex *Forbes*, Pinet. Woburn. 125, t. 44 (1839).

[*Abies grandis* Franco in Bol. Soc. Brot. 23, 161 (1949), non Dougl. ex Lindl.].

CHINESE SILVER FIRS.

Several silver firs from China closely related to *Abies delavayi* Franch. (Journ. de Bot. 256, 1899) have been described as distinct species under the names *A. faxoniana* Rehd. & Wils., *A. forrestii* C. C. Rogers, *A. faberi* (Mast.) Craib and *A. georgei* Orr. In the light of additional native material and much from trees raised from native seed, it is now evident that the characters on which these taxa were founded merge into one another or become variously assorted in different individuals and that the whole group is best regarded as a single species. Individual trees of '*A. faberi*' have been found to produce both flattened leaves and the much enrolled leaves typical of *A. delavayi*. The name '*A. faberi*' may be treated as a synonym of *A. delavayi*. The remaining taxa differ sufficiently from typical *A. delavayi* to be treated as varieties of it. A. B. Jackson (Ill. New Conif. 4, 5, 1935) has already made the necessary varietal combinations for '*A. faxoniana*' and '*A. forrestii*' but the following new combination is required for Orr's plant.

***Abies delavayi* Franch. var. *georgei* (Orr) Melville, var. nov.;**

A. georgei Orr, Not. Bot. Gard. Edin. 18, 1 (1933).

THE COFFIN JUNIPER

The Coffin Juniper of Upper Burma was described by A. B. Jackson as *Juniperus coxii*. Dallimore discussed its status in the third edition of their joint work (Handbook of Coniferae, ed. 3, 322, 1948), but did not commit himself fully either to uniting it with *J. recurva* Buch.-Ham. or to making it a variety of that species. The Coffin Juniper is best regarded as a variety of *J. recurva* and the following combination is required.

***Juniperus recurva* Buch.-Ham. ex D. Don in Prod. Fl. Nep. 55 (1825) var. *coxii* (A. B. Jacks.) Melville, var. nov.; *J. coxii* A. B. Jacks., Ill. New Conif. 36 (1935).**

THE AUSTRIAN PINE

The name *Pinus nigra* Arnold (Reise n. Mariazell, 8, 1785) has been accepted for some time as the correct name for the Austrian Pine and for Black Pines of Europe in the wide sense. Franco (An. Inst. Sup. Agron., Lisboa, 16, 131, 1949) following Huguet del Villar (Ber. Schweiz. Bot. Ges. 57, 151, 1947) has accepted *Pinus clusiana* Clementi (Arias Adic. Agric. Gen. Herrera 2, 404 1818) instead, on the grounds that *P. nigra* Arnold was a provisional name. In his text, Arnold made it quite clear that he was distinguishing his species from the 'Weissfohre' (i.e. *P. sylvestris* L.) and he gave the distinguishing characters. The name '*P. nigra* Arnold' is not a provisional name in the sense of Article 33 of the International Code of Botanical

Nomenclature. The presence of the question mark after the name under the figure indicates diffidence on the part of the author as to the suitability of the epithet, not taxonomic doubt. This situation is covered by note 1 under Article 33. *P. nigra* Arnold should continue in use as the name for the Austrian Pine.

THE CORSICAN PINE

Among the Black Pines referable to *Pinus nigra* Arnold, the most important economic variety is the Corsican Pine. For a number of years this variety has passed under the name *P. nigra* Arnold var. *calabrica* (Loud.) Schneid. This combination was not validly made by Schneider, however (Silva Tarouca Frieland. Nadelh. 261, 1913) as he did not mention the original place of publication of the epithet. Loudon (Arb. & Frut. Brit. 4, 2201, 1838) gave two varietal epithets for the taxon as it is now accepted, namely *corsicana* and *calabrica*. Both of these are *nomina nuda* in his context, but he attributed them to Delamarre. Of the three works on pines cited for this author in the Bradley Bibliography the two earliest were published in 1820. However, Loudon cites *Pinus sylvestris* = *maritima* Aiton (Hort. Kew. 3, 366, 1789) as a synonym for *P. laricio* Poir., a name which belongs to the Corsican Pine. Aiton did not provide a description for his variety, but cited '*Pinus maritima major* Duhamel. Arb. 2, 125 t. 28.' (1758) Duhamel did not use binomial nomenclature in this work. The trinomial mentioned is the first of three phrase names in the pre-Linnean tradition quoted by him for this variety. Although Duhamel gave no description, his figure is a good illustration of a coning branch, which is clearly recognisable as the Corsican Pine and this is sufficient to validate Aiton's epithet. It is evident that Duhamel was not referring to the Cluser pine (*P. pinaster* Ait.) which is sometimes called Maritime Pine, for this is his no. 4, '*Pinus maritima altera* Mathiol., C.B.P.', which, also, is illustrated by a clearly recognisable figure.

The earliest valid varietal epithet for the Corsican Pine, therefore, appears to be '*maritima*' and the following new combination is required:

***Pinus nigra* Arnold, var. *maritima* (Aiton) Melville, comb. nov.**

P. sylvestris L. var. *maritima* Aiton, Hort. Kew. 3, 366 (1789).

P. laricio Poir. in Encycl. Meth. Bot. 5, 339 (1804), non *P. laricio* Savi (1798), nec Santi (1806).

P. nigra Arnold var. *calabrica* (Loud.) Schneider in Silva Tarouca, Frieland Nadelh., 261 (1913).

BOWENIA SERRULATA (Bull) Chamberlain.

Bowenia serrulata was recognised as a species by Chamberlain (Bot. Gaz. 54, 419, 1912), but he attributed the epithet to André. The plant is referred to by André (Ill. Hort. 26, 184, t. 366, 1879) as *B. spectabilis* var. *serrulata* Hort. Angl. and the figure that accompanies his account is clearly a copy of one in Bull's catalogue of 1878. In this catalogue, Bull gave a short description and two figures, one representing an entire plant and the other a few leaflets on a larger scale. The name is printed as '*Bowenia spectabilis serrulata*', but, in conformity with his custom and that of other nurserymen of the day, it is evident that the epithet '*serrulata*' is varietal.

Bull's combination was first published, as a *nomen nudum* (Gard. Chron. N.S. 8, 310, 1877) in an account of the International Horticultural Exhibition held at Carlisle in 1877, where the plant was exhibited. Valid publication dates from Bull's catalogue of 1878, the precise time of issue of which is not known, although it had probably been distributed by May of that year. The name appeared in two other publications in 1878, but these must be later, as they copy one or other of Bull's figures and refer to his catalogue.

The correct citation and relevant literature are as follows:

Bowenia serrulata (Bull) Chamberlain in Bot. Gaz. 54, 419 (1912).

B. spectabilis var. *serrulata* Bull, Gard. Chron. N.S. 8, 310 (1877) nom. nud.

B. spectabilis var. *serrulata* Bull. Cat. 1878 (? May 1878);

T. Moore in Florist & Pomologist, 107 (July 1878); Regel in Gartenflora 27, 314 (1878); André in Ill. Hort. 26, 184, t. 366 (1879).

A Naturalist's Edition of Bartram's 'Travels'.*—William Bartram (1739–1823) was fortunate in his home and upbringing. His father, John Bartram, had founded a famous botanical garden near Philadelphia, corresponded with all the leading botanists of the Linnean period, and was to become Botanist to His Majesty George III. William accompanied his father in the field, but his early career was a succession of failures both as business-man and planter. He was a born naturalist and draughtsman who could not sit at a desk, although he was to become strangely sedentary as he grew older. He found his feet under the patronage of Dr. John Fothergill and was able to undertake his celebrated journey of discovery in 1773–1777, lasting nearly four years, through the Southern Colonies of Georgia, Carolina and Florida. His journals have been mostly lost (two mss. volumes of reports on field-work, which had been sent to Dr. Fothergill, were published in 1943), but Bartram's romantic imagination fed on his experiences and he was also a writer. In 1791, at the age of 52, he published the book of his 'Travels', which quickly ran through many European editions.

It was not well received by critics with concrete, 18th century minds: they found Bartram's style florid and did not appreciate his Rousseauesque view of the Indian as the 'noble savage'. But the book delighted Wordsworth and Coleridge, and descriptive passages in it inspired some of the immortal lines of 'Kubla Khan'. It is the work of a sensitive lover and keen observer of nature, and should be far better known to English readers. In 1905, Professor Lane Cooper wrote in *The Nation*, 'Could not some patriotic Philadelphian be induced to revive the "Travels" of the Quaker natural scientist, William Bartram?'

The answer has come from Mr. Francis Harper, who has prepared for naturalists this special edition of the 'Travels', in which he supplements Bartram's book with a long commentary of explanatory notes; an annotated index of place-names, persons, animals, plants, minerals and other words of scientific interest; and a bibliography. No-one was better qualified to do this than Mr. Harper, who for more than 40 years has combined his own field-studies with enthusiasm for Bartram's work, retracing his routes and even

collecting some of his plants in their original stations. He reminds us in the introduction that some of Bartram's specimens, as well as drawings of plants and animals made during his journey, are preserved at the British Museum (Natural History). The handsome, scholarly volume he has given us is complete with portrait, reproductions of drawings, and maps, and ends with attractive photographs of the Bartram country as it appears today.

N. Y. SANDWITH.

* 'The Travels of William Bartram'. Naturalist's Edition. Edited with commentary and an annotated index, by Francis Harper, pp. lxi, 727, illustrations, facsimiles, maps and photographs. Yale University Press, 1958. London: Oxford University Press. 68s.

An Introduction to Botany.*—Quite a number of elementary books on botany have been written for the use of university students who are approaching the subject for the first time, or for advanced students who are still at school. It is perhaps only natural that most of these books have their good and their bad points, for he would be a giant amongst authors who could devise the ideal text to meet the requirements of all students of all temperaments. The fact that the book under review is now in its 17th edition indicates that it must be a popular one amongst German speaking students. This is not surprising for the book is well balanced, is written in clear and simple language, it is well illustrated and as up to date as it is possible for an elementary text to be. Its approach is along orthodox lines. After starting with the external form of the plant, the student is given a clear picture of the essentials of anatomy, and is then led on to consider reproduction, ontogeny and finally to physiology. The book now under review, being only part I of the whole work, does not cover plant classification or geographical distribution. An unusual feature of the book is the wide margins to the text, presumably for the insertion of manuscript notes. This book might very usefully be employed in England as a German reader for botany students.

C. R. METCALFE.

* Mische, H. 'Taschenbuch der Botanik'. Bearbeitet von Prof. Dr. Mevius, Hamburg. Teil I: Morphologie, Anatomie, Fortpflanzung, Entwicklungsgeschichte, Physiologie. 17th edition: pp. 291: 365 text figures. Georg Thieme Verlag, Stuttgart. 1959. D.M. 12.80.

Flora of Peru.*—This part of the Flora of Peru, a work whose authorship has previously been ascribed to Mr. J. Francis Macbride, is contributed by Prof. Rogers McVaugh, Curator of Vascular Plants at the University of Michigan, and is devoted to the *Myrtaceae*, a family disliked and shunned by most workers on the flora of Tropical America. This treatment will therefore be important for students, not only of Andine floras, but also of those of Guiana and Amazonian Brazil. Mercifully, it provides two keys to the genera, one for flowering, the other for fruiting material. *Aulomyrcia* is reduced to *Myrcia*, and *Syzygium jambos* is brought back into *Eugenia*. Such genera as *Blepharocalyx*, *Myrciaria*, *Myrcianthes*, *Myrteola*, *Plinia* and *Ugni* are all maintained, and so is Berg's genus *Acca*, the unfamiliar name of some species with long, red, staminal filaments recalling those of *Feijoa*.

N. Y. SANDWITH.

* Flora of Peru, [*Myrtaceae*] by Rogers McVaugh, being Field Museum of Natural History Publication 861, Botanical Series, vol. 13, pt. 4, no 2, pages 569-818, November 28th, 1958. Price \$3.75.

- *achyranthes* Forsk. apud Chr., 172.
 — *achyranthoides* Forsk., 172, 174.
 — *echinata* Sm., 174.
 — *leiantha* (Seub.) Alain, 174.
 — *parvifolia* (Moq.) Fawcett & Rendle, 175.
 — *peplodes* (Humb. & Bonpl.) Urban, 175.
 — *pungens* H.B.K., 172, 174.
 — *repens* Gmelin, 172, 174.
 (L.) Kuntze, 174, 172.
 (L.) Link, 174.
 — — Urb., 175.
 — *sessilis* (L.) DC., 172, 171.
 — *villiflora* Scheele, 175.
 America : Contributions to the Flora of Tropical, P. G. Wilson, LXIII, 155.
 N. Y. Sandwith, LXIV, 420.
 LXV, 427.
 Anagallis : New species and additional records in the genus, P. Taylor, 133.
 Anagallis L., 133.
 subgenus *Jirasekia* (F. W. Schmidt) P. Tayl., 134.
 acuminata Schinz, 140.
 arvensis L., 134.
 subsp. *arvensis*, 134.
 brevipes P. Tayl., 135.
 djalonis A. Chev., 141.
 filiformis Cham. & Schlecht., 137.
 gracilipes P. Tayl., 135.
 hexamera P. Tayl., 137.
 hurneri Hess, 139.
 huttonii Harv., 135.
 kingaensis Engl., 137.
 kochii Hess, 139.
 oligantha P. Tayl., 137.
 pumila Sw., 140.
 var. *barbata* P. Tayl., 141.
 var. *djalonis* (A. Chev.) P. Tayl., 141.
 var. *pumila*, 140.
 rhodesiaca R. E. Fries, 140.
 serpens subsp. *mzyeri-johannis* Engl., 135.
 tenuicaulis Bak., 140.
 Anemopaegma sect. *Climacopaegma* K. Schum., 428.
 — *Osmopaegma* K. Schum., 428
 foetidum Bur. & K. Schum., 427, 428.
 leptosiphon Rusby, 428.
 maguirei Sandw., 428.
 umbellatum A. Sampaio, 428.
 Angelica officinalis Hoffm., 389.
 Angorchis conchifera (Lindl.) Kuntze, 276.
 infundibularis (Lindl.) Kuntze, 275.
 pusilla (Lindl.) Kuntze, 263.
 saccifera (Lindl.) Kuntze, 265.
 Angraecum Bory, 260.
 sect. *Afrangraecum* Summerh., 276.
 — *Angraecum*, 277.
 Arachnangraecum Schltr., 274, 273.
 — *Boryangraecum* Schltr., 265, 266.
 Conchoglossura Schltr., 270.
 Eu-angraecum Schltr., 277.
 Hildebrandtiangraecum Schltr., 266, 270.
 — *Lepervenchea* (Cordem.) Schltr., 269.
 — *Micrangraecum* Schltr., 263.
 — *Pectinaria* (Cordem.) Schltr., 261.
 — *affine* Schltr., 268.
 angustipetalum Rendle, 271, 85, 272.
 angustum (Rolfe) Summerh., 268, 85.
 anocentrum Schltr., 269.
 arnoldianum De Wild., 274.
 arthrophyllum (Kraenzl.) Schltr., 262.
 astroarche Ridl., 275.
 birrimense Rolfe, 274.
 bistortum Rolfe, 87.
 bokoyense De Wild., 83.
 boonei De Wild., 272.
 braunii Schltr., 273.
 brongniartianum Linden., 277.
 burchellii Rchb. f., 264, 266.
 canaliculatum De Wild., 263.
 caulescens Thou., 265, 269.
 chamaeanthus Schltr., 263.
 chevalieri Summerh., 271, 85.
 christyanum Rchb. f., 83.
 claessensii De Wild., 267, 268.
 clavatum (Rendle) Schltr., 268.
 conchiferum Lindl., 275.
 cultriforme Summerh., 272.
 curvicaule Schltr., 86.
 curvipes Schltr., 271.
 distichum Lindl., 261.
 var. *grandifolium* (De Wild.) Summerh., 261.
 dives Rolfe, 265.
 doratophyllum Summerh., 262.
 eburneum Bory, 277.
 egertonii Rendle, 271.
 eichlerianum Kraenzl., 274, 275.
 erectum Summerh., 273.
 firthii Summerh., 267, 268.
 foxii Summerh., 273.
 gabonense Summerh., 262.
 giryamae Rendle, 277.
 graminifolium (Ridl.) Schltr., 86.
 humile Summerh., 269.
 imbricatum Lindl., 261.
 (Sw.) Schltr., 261.
 infundibulare Lindl., 275.
 keniae Kraenzl., 271.
 ligulatum Summerh., 276.
 malanganum Kraenzl., 83.
 marcupio-calcaratum Kraenzl., 83.
 minus Summerh., 264.
 modicum Summerh., 84, 271, 272.
 mosakoko De Wild., 276, 277.
 moloneyi Rolfe, 83.
 mombasense Rolfe, 83.
 multiflorum Thou., 273.
 multinomination Rendle, 268, 85, 260, 270.
 musculiferum H. Perrier, 86.
 ovalifolium De Wild., 83.
 parcum Schltr., 265.
 podochilooides Schltr., 262.
 podophyllum Summerh., 86.
 pungens Schltr., 262.
 pusillum Lindl., 263, 264.
 pynaertii De Wild., 83.
 pyriforme Summerh., 268, 271.

- Angraecum ramosum* Thou., 276.
 — *reygaertii* De Wild., 276.
 — *sacciferum* Lindl., 265, 266, 269.
 — *scabripes* Kraenzl., 276.
 — *schoellerianum* Kraenzl., 83.
 — *spectabile* Summerh., 274.
 — *stolzii* Schltr., 273.
 — *subulatum* Lindl., 263.
 — *superbum* Thou., 277.
 — *teres* Summerh., 265.
 — *verrucosum* Rendle, 276.
 — *viride* Kraenzl., 273, 85.
 — *xylopus* Rehb. f., 265.
 — *zigzag* De Wild., 83.
Aniseia calycina (Roxb.) Choisy 204.
 — *medium* (L.) Choisy 186.
Ankylocheilos coxii Summerh., 278.
Aphelaria funalis (P. Henn.) Reid., 529.
Apium graveolens L., 389.
Aptinothrips rufus (Gmelin), 298.
Arachnopeziza eriobasis (Berk.) Korf, 334.
 Arboretum North : Review of the work during 1957, 19.
 Arboretum South : Review of the work during 1957, 16.
Ardisiandra Hook. f., 146.
 — *engleri* Weim., 147.
 — — *var. microphylla* Weim., 147.
 — *orientalis* Weim., 147.
 — — *var. hirsuta* Weim., 147, 149.
 — *primuloides* Knuth, 146.
 — *sibthorpioides* Hook. f., 147.
 — *stolzii* Weim., 147, 149.
 — *wettsteinii* R. Wagner, 147, 149.
Arenaea Penz. & Sacc., 323.
 Argentina (North) and Bolivia : Ascomycetes collected by Dr. R. Singer in, R. W. G. Dennis, 151.
Argyria grantii Bak., 189.
 — *hanningtoni* Bak., 215.
 — *laxiflora* Bak., 189.
Arrabidaea bangii Sprague, 429.
 — *brachypoda* (DC.) Bur., 429.
 — *candicans* (Rich.) DC., 429.
 — *corallina* (Jacq.) Sandw., 430, 431.
 — *egensis* Bur. & K. Schum., 441.
 — *elliptica* Bur. & K. Schum., 429.
 — *japurensis* (DC.) Bur. & K. Schum., 440, 441.
 — *lenticellosa* Bur. & K. Schum., 441.
 — *macrocarpa* Kuntze, 428.
 — *macrophylla* K. Schum., 429.
 — *multiflora* Bur. & K. Schum., 434.
 — *obovata* DC., 429.
 — *oligantha* Bur. & K. Schum., 441.
 — *orbignyana* DC., 428, 429.
 — *pachycalyx* Sprague, 429.
 — *pentstemonoides* Kraenzl., 437.
 — *platyphylla* (Cham.) Bur. & K. Schum., 429.
 — — DC., 429.
 — *puberula* (DC.) Bur., 433.
 — *pulchella* (Cham.) Bur., 433.
 — *rhodantha* Bur. & K. Schum., 431.
 — — *var. elliptica* Sprague forma *glabrescens* Sprague, 431.
 — — *var. genuina* Hassl., 431.
 — *rubrinervis* Miers, 428.
 — *subfastigiata* Bur. & K. Shum., 428.
 — *syringothyrsus* Kraenzl., 429.
Asclepias vincetoxicum L., 302.
Ascobolus foliicola Berk. & Broome, 151.
 Ascomycetes collected by Dr. R. Singer in Bolivia and North Argentina, R. W. G. Dennis, 151.
 Asia : Further New Species and Notes on the Agapetes of Continental, H. K. Airy Shaw, 468.
 Asiatic Grasses : XXXII : Notes on, N. L. Bor, 225.
Aspidium boryanum Willd., 447, 448, 449.
 — *tenuisetum* Bl., 448.
Asplenium macdonellii Bedd., 449.
 — *oosorum* Bak., 448.
 — *pellucidum* Lam., 454.
Asterochlaena Corda, 189.
 — Garcke, 189.
Astragalus L. from W. Pakistan and N.W. Himalayas : Notes on the genus, S. I. Ali, 303.
Astragalus subgenus *Astragalus*, 303, 305
 — subgenus *Caprinus* Bunge, 308.
 — subgenus *Cercidotherix* Bunge, 315.
 — series *Monocarpici* Boiss., 303.
 — subgenus *Pogonophace* Bunge, 303.
 — subgenus *Trichostachys* Bak., 303.
 — subgenus *Trimeniaeus* Bunge, 303.
 — *adesmiaefolius* Bunge, 304.
 — *agrestis* Freyn, 305.
 — *aitchisonii* Sirjaev & Rechinger f., 315.
 — *ammophilus* Karelin & Kirilow, 306, 307.
 — — *var. ammophilus*, 306.
 — *var. persipolitanus* (Boiss.) Ali, 306.
 — *anfractuosus* Bunge, 316.
 — *askabadensis* Kuntze, 311.
 — *bakeri* Ali, 307.
 — *bakuensis* Bunge, 309, 310, 311.
 — *barbicalyx* Ali, 308, 310.
 — *camporum* Boiss., 304, 305.
 — *candolleanus* Benth., 312.
 — — *var. pindreensis* Bak., 312.
 — *canispinus* Boiss., 315.
 — *chitralensis* Ali, 308.
 — *ciliolatus* Bunge, 308.
 — *coluteocarpus* Boiss., 303.
 — — *var. coluteocarpus*, 304.
 — — *var. glaber* Ali, 304.
 — *compositus* N. Pavlov, 307.
 — *decemjugus* Bunge, 313.
 — *erionotus* Bunge, 309.
 — *filicaulis* Karelin & Kirilow, 305.
 — *flemingii* Ali, 310, 311, 312.
 — *genistoides* Boiss., 312, 314.
 — *glaberrimus* Sirjaev & Rechinger f., 307.
 — *hemsleyi* Aitchison & Bak., 314, 315.
 — — Boiss., 313.
 — *hendersonii* Bak., 303.
 — *heydei* Bak., 303.
 — *hippocrepidis* Bunge, 304, 305.
 — *hoffmeisteri* (Klotzsch) Ali, 304.
 — — *var. hoffmeisteri*, 304.
 — — *var. pilosus* Ali, 304.
 — *humifusus* Bak., 305.

- *kuramensis* Bak., 308.
- *kurumensis* Bunge, 308.
- *leptodermus* Bunge, 305.
- *longicaulis* Bak., 307.
- *macrobotrys* Bunge, 315.
- *malacophyllus* Bunge, 312.
- *maxwellii* Benth., 308.
- *orbiculatus* Ledebour, 309.
- *persipolitanus* Boss., 306, 307.
- *pindreensis* (Bak.) Ali, 312.
- *pseudo-psilacanthus* Ali, 312, 313, 314, 315.
- *pseudosquarrosus* Sirjaev & Rechinger f., 316.
- *psilacanthus* Boiss., 312, 313, 314, 315.
- *psilopterus* Bunge, 312.
- *punjabicus* Sirjaev, 305.
- *pyncnorhizus* Benth., 303.
- *retamocarpus* Boiss. & Hohen., 311.
- *sangonensis* Sirjaev & Rechinger f., 316.
- *scorpiurus* Bunge, 304, 305.
- *squarrosus* Bunge, 315, 316.
- — var. *sangonensis* (Sirjaev & Rechinger f.) Ali, 316.
- — var. *squarrosus*, 315.
- *subconduplicatus* Ali, 315.
- *subulatus* Desf., 316.
- — Pallas, 316, 317.
- *subuliformis* DC., 316, 317.
- *subumbellatus* Klotzsch, 304, 305.
- *sykesiae* N. D. Simpson, 316.
- *tephrosoides* var. *lacei* Ali, 307.
- *tibetanus* Bunge, 308.
- *toppinianus* Ali, 309, 310.
- *tribuloides* Del., 306, 307.
- *verticillaris* Bunge, 308.
- — L., 308.
- Astripomoea* Meeuse, 189.
- *cephalantha* (Hallier f.) Verdcourt, 197.
- *delamereana* (Rendle) Verdcourt, 196.
- *grantii* (Rendle) Verdcourt, 196.
- *hyoscyamoides* (Vatke) Verdcourt var. *hyoscyamoides*, 196.
- — var. *melandrioides* (Hallier f.) Verdcourt, 197.
- *lachnosperma* (Choisy) Meeuse, 195.
- *malvacea* (Klotzsch) Meeuse, 192.
- — var. *epedunculata* (Rendle) Verdcourt, 194.
- — var. *floccosa* (Vatke) Verdcourt, 195.
- — var. *involuta* (Rendle) Verdcourt, 195.
- — var. *malvacea*, 192.
- — var. *volkensii* (Dammer) Verdcourt, 193.
- *nogalensis* (Chiov.) Verdcourt, 191.
- *polyccephala* (Hallier f.) Verdcourt, 197.
- *tubiflora* (Hallier f.) Verdcourt, 191.
- Astrochlaena* Hallier f., 189.
- *annua* Rendle, 196.
- *cephalantha* Hallier f., 197.
- *delamereana* Rendle, 196.
- *engleriana* Dammer, 192.
- *floccosa* (Vatke) Hallier f., 195.
- *grantii* Rendle, 195, 196.
- *hyoscyamoides* (Vatke) Hallier f., 196.
- *involuta* Rendle, 195.
- *kaessneri* Rendle, 195.
- *lachnosperma* (Choisy) Hallier f., 195.
- *ledermannii* Pilger, 194.
- *magisii* De Wild., 194.
- *malvacea* (Klotzsch) Hallier f., 192.
- — var. *epedunculata* Rendle, 194.
- — var. *parviflora* Rendle, 193.
- *melandrioides* Hallier f., 197.
- *menispermoides* Standley, 194.
- *mildbraedii* Pilger, 194.
- *nogalensis* Chiov., 191.
- *phillipsiae* (Bak.) Rendle, 194.
- *polyccephala* Hallier f., 197.
- *rotundata* Pilger, 194.
- *solanacea* Hallier f., 195.
- *stuhlmanni* Hallier f., 195.
- — var. *parviflora* Rendle, 194.
- *tubiflora* Hallier f., 191.
- *ugandensis* Rendle, 196.
- *volkensii* Dammer, 194.
- *whytei* Rendle, 196.
- Astromerremia digitata* Pilger, 185.
- Athyrium pterorachis* C. Chr., 449.
- *tomentosum* Milde, 454.
- *viridifrons* Makino, 449.
- Australia : Contributions to the Flora of, V. The identity of *Calandrinia polyandra* Benth., R. Melville, 400.
- Australian Heliotiales and Ostropales : Critical Notes on some, R. W. G. Dennis, 321.
- Avicennia floridana* Gandoger, 34.
- — Raf., 34.
- *germinans* (L.) Stearn, 34.
- *nitida* Jacq., 34.
- *schauerana* Moldenke, 36.
- *tomentosa* Jacq., 34, 36.
- Baker, Kenneth F. : The U.C. System for Producing Healthy Container-Grown Plants (Rev.), 106.
- Baliothrips dispar* (Hal.), 300.
- Bannerman, D. A. : Larger Birds of West Africa (Rev.), 360.
- Bean, W. J. : Ornamental Trees (Rev.), 408.
- Beccariella* Ces., 518.
- *caespitosa* Cooke, 529.
- *insignis* Ces., 518, 524.
- *kingiana* Massee, 524.
- *trilii* Cooke, 523, 524.
- Belonidium hirtipes* A. L. Smith, 462.
- *sclerogenum* (Berk. & Curt.) Sacc. var. *musicola* Dennis, 461.
- Bersama abyssinica* Fres. subsp. *abyssinica* var. *gracilipes* (Mildbraed) Verdcourt, 219.
- *gracilipes* Mildbraed, 219.
- Bertiera and Pauridiantha (Rubiaceae) in West Tropical Africa : Some additions to, F. N. Hepper, 405.
- Bertiera laxa* Benth. var. *bamendae* Hepper, 405.
- — var. *laxa*, 405, 406.
- *mailandii* Hutch. & Dalz., 406.
- Bignonia benensis* Rusby, 430.
- *boliviana* Rusby, 430.

- Bignonia brevipes* Rusby, 430.
 — *columbiana* Morong, 431.
 — *cuneifolia* DC., 436.
 — *cymbalum* Cham., 420, 425.
 — *eximia* Morong, 431.
 — *hibiscifolia* Cham., 433.
 — *imperatoris-maximiliani* Wawra, 439.
 — *leucantha* Vell., 441.
 — *morongii* Britton, 431.
 — *perforata* Cham., 430.
 — *rusbyi* Rusby, 431.
 — *tenuiflora* DC., 432.
- Bignoniaceae : Studies in, N. Y. Sandwith, XXIII, 420.
 — XXIV, 427.
- Bivinia jaubertii* Tul., 218.
Blepharitheca Pichon, 433.
- Blunt, Wilfrid (Ed.) : Flowers drawn from Nature (Rev.), 224.
- Bolbitis diversifolia* (Bl.) Schott, 454.
 — *nitens* Holtt., 453, 454.
- Bolivia and North Argentina : Ascomycetes collected by Dr. R. Singer in, R. W. G. Dennis, 151.
- Bolivian Helotiales collected by Dr. R. Singer, R. W. G. Dennis, 458.
- Bontia germinans* L., 34.
- Book Reviews:—
 African Violets, Gloxinias and their relatives, by Harold E. Moore, Jr., 96.
 Amaryllis Manual, by Hamilton P. Traub, 457.
 Amateur Gardening Annual, ed. by A. G. L. Hellyer, 404.
 Amateur Gardening Diary, 1959, 399.
 Amateur Gardening Popular Encyclopedia of Flowering Plants, by A. G. L. Hellyer, 132.
 Book of Flowering Trees and Shrubs, by S. B. Whitehead, 390.
 Botanical Exploration of the Trans-Mississippi West, by Susan Delano McKelvey, 184.
 British Wild Flowers, by Patricia Lewis, 397.
 Bush Peaches, by C. P. H. Wilson, 301.
 Cactus Guide, by Ladislaus Cutak, 223.
 Country Life Annual, 1958, 154.
 Drawings of British Plants. Part X, Saxifragaceae and Crassulaceae, by Stella Ross-Craig, 224.
 Experimental Control of Plant Growth, with special reference to the Earhart Plant Research Laboratory at the California Institute of Technology, by Frits W. Went and other contributors, 228, 229, 230.
 Flora of Guatemala, by Paul C. Standley and Julian A. Steyermark, 386.
 Flora of Peru, [Myrtaceae], by Rogers McVaugh, 536.
 Flora of San Francisco, California, by John Thomas Howell, 294.
 Flora of Wiltshire, by Donald Grose, 110.
 Flowers drawn from Nature, edited by Wilfrid Blunt, 224.
- Fragrance in the Garden, by Norman Taylor, 252.
- Garden Design, by Sylvia Crowe, 397.
- Garden Plants in Colour : an Amateur Gardening encyclopedia, by A. G. L. Hellyer, 411.
- Gardening for Display, by J. R. B. Evison, 399.
- Glasshouse Heating Systems (Horticultural Machinery Leaflet No. 1, 1958), 197.
- Glossary of Mycology, by Walter H. Snell and Esther A. Dick, 403, 404.
- Grapes, Peaches and Nectarines, by H. R. Tuffin, 198.
- Growing African violets in the Home, by M. P. Milsted, 30.
- Handlist of the Shropshire Flora, by L. C. Lloyd and E. M. Rutter, 390.
- How to Identify Plants, by H. D. Harrington, 446.
- Intelligent Gardening : A practical guide to labour-saving methods, by F. R. McQuown, 406.
- International Code of Nomenclature of Bacteria and Viruses. Bacteriological Code. Edited by the Editorial Board of the International Committee on Bacteriological Nomenclature, 256.
- Larger Birds of West Africa, by D. A. Bannerman, 360.
- Library of Medicinal Plants. Collected by Henry G. de Laszlo, 426.
- Maples Cultivated in the United States and Canada, by Brian O. Mulligan, 381.
- Micro-organisms in the soil, by A. Burges, 406.
- Mixed Border, by Christopher Lloyd, 95.
- Mountain Flowers, by John Raven and Max Walters, 395.
- Orchids of Peru : Part 1, by Charles Schweinfurth, 254.
- Origin of the African Flora, by Prof. A. S. Boughey, 108.
- Ornamental Trees, by W. J. Bean. Ed. 2. Revised and enlarged by S. A. Pearce, 408.
- Outdoor Chrysanthemums for garden and exhibition, by E. Morley Jones, 96.
- Simple Propagation, by Noel J. Prockter, 426.
- Taschenbuch der Botanik, begründet von Hugo Mische, 456, 536.
- Textbook of Pharmacognosy, by G. E. Trease, 7th Ed., 56.
- Travels of William Bartram, ed. by Francis Harper, 536.
- Trees of the Duars and Terai, by E. O. Shebbear, 198.
- U. C. System for Producing Healthy Container-Grown Plants, ed. by Kenneth F. Baker, 106.
- Bor, Dr. N. L., 1.

- Notes on Asiatic Grasses : XXXII, 225.
 Botanical Congress : International, Ninth, 38.
 Boughey, Prof. A. S. : The Origin of the African Flora (Rev.), 108.
Bowenia serrulata (Bull) Chamberlain, 534, 535.
 — *spectabilis* var. *serrulata* Bull, 535.
 Bremekamp, C. E. B. : Two New Species of Oldenlandia from East Africa, 382.
 Brennan, J. P. M. : A Cultivated Species of *Cassia* Allied to *C. javanica*, 180.
 — New and Noteworthy *Cassias* from Tropical Africa, 231.
 — Notes on Mimosoideae : V, 407.
 — — VI, 409.
 — — VII, 412.
 — and Hilcoat, Dorothy : The Identity of *Acacia horrida* (L.) Willd., 39.
Breweria malvacea Klotzsch, 192.
Bulbophyllum falcatum (Lindl.) Rchb. f., 75.
 — *peperomioides* Kraenzl., 75.
 Bullock, A. A. : *Deppea*, *Deppia* and the lectotype species of *Lycaste*, 253.
 — Endlicher's *Enchiridion Botanicum* of 1841, 467.
 — Index Kewensis—a correction, 514.
 — Nomenclatural Notes : V, 88.
 — — VI, 97.
 — — VII, 109.
 — — VIII, 253.
 — — X, 302.
 — — XI, 391.
 — On the application of the name *Vincetoxicum*, 302.
 — The type of the generic name *Saba*, 391.
 — and Gillett, J. B. : Nomenclatural Notes : IX, 255.
 — and Harrison, S. G. : Nomenclatural Notes : IV, 52.
 Burges, A. : Micro-organisms in the Soil (Rev.), 406.
Bursera crenata P. G. Wilson, 156.
 — *hintoni* Bullock, 156.
 — *sarcopoda* P. G. Wilson, 156.
 — *trimera* Bullock, 156.
Calandrinia polyandra Benth., The identity of : Contributions to the Flora of Australia : V, R. Melville, 400.
Calandrinia polyandra Benth., 400, 401
Caligula pulcherrima (Hook.) Klotzsch, 478.
Calycella discedens (Karst.) Dennis, 464.
 — *striata* (Rodway) Dennis, 332, 333.
 — *sulfurina* (Quél.) Boud., 464.
Calycina Seaver, 321.
Calyptrochilum bokoyense (De Wild.) Schltr., 83.
 — *christyanum* (Rchb. f.) Summerh., 83.
 — *emarginatum* (Sw.) Schltr., 261.
 — *malanganum* (Kraenzl.) Schltr., 83.
 — *marsupio-calcaratum* (Kraenzl.) Schltr., 83.
 — *moloneyi* (Rolfe) Schltr., 83.
 — *mombasense* (Rolfe) Schltr., 83.
 — *orientale* Schltr., 83.
 — *ovalifolium* (De Wild.) Schltr., 83.
 — *pynaertii* (De Wild.) Schltr., 83.
 — *schoellerianum* (Kraenzl.) Schltr., 83.
 — *zigzag* (De Wild.) Schltr., 83.
Camillea labellum Mont., 153.
Campoplepis ramiflora (Taub.) Radlk., 218.
Campylanthus spinosus Balf. f., 220.
 Capparidaceae : Notes on African, R. A. Graham, I, 31.
 — — — II, 177.
 Carter, Miss S., 2.
 Carter, S. and Gillett, J. B. : *Xylocalyx* (Scrophulariaceae) in Somaliland, 359.
Caryophyllus aromaticus L., 52.
 Cassia : A Cultivated species allied to *C. javanica*, J. P. M. Brennan, 180.
Cassia abbreviata Oliv., 231.
 — subsp. *abbreviata*, 231, 232, 233.
 — subsp. *beareana* (Holmes) Brennan, 232, 233, 234.
 — var. *glabrifrutifera* Steyaert, 231, 232, 234.
 — var. *granitica* (Bak. f.) Bak. f., 232.
 — subsp. *kassneri* (Bak. f.) Brennan, 233, 234.
 — *acutifolia* Del., 243.
 — *afrodistula* Brennan, 234, 235, 236, 238.
 — var. *afrodistula*, 237.
 — var. *patentipila* Brennan, 238.
 — *agnes* (De Wit) Brennan, 180.
 — *alata* L., 250.
 — *andrieuxii* Benth., 160.
 — *angustifolia* Vahl, 243.
 — *arachoides* Burch., 242, 243.
 — *aschrek* Forsk., 239, 240.
 — *atroreticulata* Chiov., 234.
 — *bakeriana* Craib, 180.
 — *beareana* Holmes, 231, 233, 234, 238.
 — *bequaertii* De Wild., 232, 233.
 — *botteriana* Benth., 159.
 — *burtii* Bak. f., 238, 235.
 — *droogmansiana* De Wild., 232, 233.
 — *ellisae* Brennan, 247, 248.
 — *fistula* L., 236, 238.
 — *granitica* Bak. f., 231, 232, 233.
 — *holosericea* Fres., 244, 245.
 — *humifusa* Brennan, 246, 247.
 — *italica* (Mill.) F. W. Andr., 239, 240, 243, 245.
 — subsp. *arachoides* (Burch.) Brennan, 242.
 — subsp. *italica*, 239, 240, 242.
 — subsp. *micrantha* Brennan, 240, 241, 242.
 — *javanica* L. var. *agnes* De Wit, 180.
 — var. *indochinensis* Gagnep., 180.
 — *kassneri* Bak. f., 231, 234.
 — *longiracemosa* Vatke, 245, 247.
 — *multifoliata* P. G. Wilson, 159.
 — *nodosa* Roxb., 180.
 — *obovata* Collad., 239, 240.
 — var. *genuina* Bischoff, 240.
 — var. *micronata* Burt Davy, 243.
 — var. *obtusata* (Hayne) Bischoff, 240.
 — var. *pallidiflora* Dinter, 242.
 — var. *pilosa* Burt Davy, 243.
 — var. *platycarpa* Bischoff, 242.

- Cassia obtusata* Hayne, 240.
 — *obtusifolia* L., 248, 249, 250, 251, 252.
 — *senna* L., 243, 244, 245.
 — var. *obtusata* Brenan, 244.
 — var. *senna*, 243, 244.
 — *sieberiana* DC., 235, 238.
 — *thyrsoides* Brenan, 234, 235.
 — *tora* L., 248, 249, 250, 251, 252.
 — *truncata* Brenan, 245.
 Cassias from Tropical Africa : New and Noteworthy, J. P. M. Brenan, 231.
Castanea lanceaefolia (Roxb.) Kurz, 514.
Castanopsis lanceaefolia Kurz, 514.
 — (Roxb.) Hickel & Camus, 514.
Catacline sericea Edgeworth, 122.
Catinella olivacea (Fr.) Boud., 353.
 Caylusea St. Hil. in Tropical Africa : The Genus, P. Taylor, 283.
Caylusea St. Hil., 283.
 — *abyssinica* (Fresen.) Fisch. & Mey., 283, 284, 286.
 — *canescens* (Murray) Webb, 285.
 — *hexagyna* (Forsk.) M. L. Green, 283, 284, 285.
 — *latifolia* P. Tayl., 283, 284, 285.
Celosia echinata Humb. & Bonpl., 174.
Cenangella Sacc., 348.
 — *tasmanica* Rodway, 347.
Cenangium recurvum Rodway, 339.
Ceratostema angulatum Griff., 481.
 — *miniatum* Griff., 480.
 — *nanum* Griff., 473.
 — *wightianum* Griff., 511.
Cerion coccineum Masee & Rodway, 355.
 — *leucophaeum* (Speg.) Dennis, 465, 466.
Cerosora Domin, 450.
 — *chrysosora* (Bak.) Domin, 451.
 — *sumatrana* Holtt., 450.
Chaenocarpus melanopus Lév., 104.
Chamaeangis gabonensis Summerh., 86.
 — *ichneumonea* (Lindl.) Schltr., 279, 280, 87.
 — *lanceolata* Summerh., 279, 280.
 — *odoratissima* (Rehb. f.) Schltr., 280.
 — *thomensis* (Rolfe) Schltr., 279, 280.
 — *vesicata* (Lindl.) Schltr., 279, 86, 87.
Cheilymenia ascoboloides (Bert.) Boud., 151.
 — *coprinaria* (Cooke) Boud., 151.
Chirothrips manicatus Hal., 298.
Chlorociboria aeruginascens (Nylander) Kanouse, 342.
 — *aeruginosa* (Fr.) Seaver, 339.
 — *musae* Dennis, 460, 461.
 — *versiforme* (Fr.) Seaver, 340, 342.
 — var. *olivacea* (Rodway) Dennis, 340.
Chlorosplenium chlora (Schwein.) Masee, 341, 342.
 — *schweinitzii* Fr., 341.
Ciboria olivacea Rodway, 340.
 — *strigosa* Rodway, 324.
Cistella carnosia (Rodway) Dennis, 331.
Cladoderris Berk., 518.
 — *australis* Berk. apud Sacc., 524.
 — *australis* Kalchbr., 518.
 — apud de Thuenen, 526.
 — *blumei* Lév., 521.
 — *brasilienis* Fries, 523.
 — *candolleana* Lév., 523.
 — *caperata* (Berk. & Mont.) Pat., 522.
 — var. *spongiaepes* (Berk.) Reinking, 526.
 — *cartilaginea* Masee, 529.
 — *crassa* (Kl.) Fr., 523.
 — *dendritica* (Pers.) Berk., 518, 523.
 — *elegans* (Jungh.) Fr., 524.
 — *floridana* Lloyd, 526.
 — *formosa* Lév., 528.
 — *funalis* P. Henn., 529.
 — *fusca* Cooke, 526.
 — *gausapata* (Fr.) Fr., 529.
 — *glaziovii* P. Henn., 526.
 — *imbricata* Pat., 523.
 — *infundibuliformis* (Kl.) Fr., 528.
 — *lamellata* (Berk. & Curt.) Pat., 525.
 — *membranacea* De Vries & Lév., 530.
 — *minima* Berk. & Broome, 530.
 — *mussooriensis* P. Henn., 530.
 — *platensis* Speg., 530.
 — *pritzelii* P. Henn., 530.
 — *rickii* Lloyd, 530.
 — *roccati* Mattirollo, 518, 524.
 — *schumanniana* P. Henn., 529.
 — *scrupulosa* Lloyd, 524.
 — *spongiosa* Fr., 524.
 — *thwaitesii* Berk. & Broome, 530.
 — *trillii* (Cooke) Lloyd, 523.
 Cleome : an overlooked species of, R. A. Graham, 31.
 Cleome : New species in, R. A. Graham, 177.
Cleome burttii R. A. Graham, 179.
 — *gallaensis* Gilg & Benedict, 177.
 — *grata* R. A. Graham, 177.
 — *hanburyana* Penzig, 177, 178.
 — *hirta* (Klotzsch) Oliv., 177.
 — *parvipetala* R. A. Graham, 177, 178.
 — *parvula* R. A. Graham, 178.
 — *silvatica* Gilg & Benedict, 178.
 — *stenopetala* Gilg & Benedict, 178.
 — *stricta* (Klotzsch) R. A. Graham, 31.
 — *strigosa* (Boj.) Oliv., 31.
 — *usambarica* Engl., 178, 179.
 Clifford, H. T. : On Putative Hybrids between *Juncus inflexus* L. and *Juncus effusus* L., 392.
 Clove : The correct name for the, A. A. Bullock and S. G. Harrison, 52.
 Clover with tuberous roots : *Trifolium somalense*, J. B. Gillett, 444.
Clytostoma binatum (Thunb.) Sandw., 430, 431.
 — *uleanum* Kraenzl., 435.
Coccomyces clusiae (Lév.) Sacc., 467.
Coffea marginata Benth., 88.
Coldenia procumbens L., 218.
Colpoma Wallroth, 356.
Conium maculatum L., 389.
Conocarpus erectus L., 36.
 — var. *erectus*, 36.
 — var. *sericeus* Griseb., 36.
 — *racemosa* L., 37.
 — *sericeus* (Griseb.) Jimenez, 36.
 Convolvulaceae : Notes on African. B. Verdcourt, II, 185.
 — — — — — III, 199.

- Convolvulus aristolochiifolius* Mill., 186.
 — *bifidus* Vahl, 186.
 — *calycinus* Roxb., 204.
 — *cymosus* Desr., 186.
 — *cynanchifolius* Wall., 200.
 — *ebracteatus* Desr., 200.
 — *hardwickii* Spreng., 204.
 — *hyoscyamoides* Vatke, 196.
 — *maximus* L.f., 209.
 — *medium* L., 186.
 — *multiflorus* Mill., 186.
 — *obscurus* L., 209.
 — *ochraceus* Lindl., 210.
 — *peltatus* L., 185.
 — *philippsiae* Bak., 193.
 — *sinensis* Desr., 204.
 — *triflorus* Vahl, 186.
 — *umbellatus* L., 186.
 — *venosus* Desr., 213.
Cookeina colensoi (Berk.) Seaver, 151.
 — *sulcipes* (Berk.) Kuntze, 151.
 — *tricholoma* (Mont.) Kuntze, 152.
 — *venezuelae* (Berk. & Curt.) Le Gal, 152.
Corallobotrys acuminata (G. Don) Hook. f., 483.
Cornopteris Nakai, 447.
 — *oosora* (Bak.) Tard., 448.
 — *opaca* (Don) Tagawa, 447, 448.
Corticium laeve forma *cucullata* Bourd. & Galz., 530.
Coryne tasmanica (Rodway) Dennis, 347, 348.
Cracca argyrotricha (Harms) Kuntze, 120.
 — *villosa* L., 121.
Craspedodictyum Copeland, 453.
Crateva capharoides Andrews, 100.
 — *fragrans* Sims, 100, 99.
Cressa cretica L., 218.
Crotalaria minor C. H. Wright, 371.
 Crowe, Sylvia : Garden Design (Rev.), 397.
Crusea grandiflora P. G. Wilson, 161.
 — *rubra* (Jacq.) Cham. & Schlecht., 161, 162.
Cryptothrips flavipes (Reuter), 301.
 Cultivated Species of Cassia Allied to *C. javanica*, J. P. M. Brenan, 180.
Cuspidaria hibiscifolia (Cham.) K. Schum., 433.
 — *multiflora* DC., 433.
 Cutak, Ladislaus : Cactus Guide (Rev.), 223.
Cyathicula multicuspidata Rodway, 334.
Cyclostoma arundinacea (Pers.) Crouan, 358.
Cymatoderma Jungh. (Cladoderris) : The genus, Derek A. Reid, 518.
Cymatoderma Jungh., 518, 519, 520.
 — sect. *Cladoderris* (Berk.) Reid, 519.
 — sect. *Cymatoderma*, 519.
 — *blumei* (Lév.) Reid, 521, 519, 520.
 — *caperatum* (Berk. & Mont.) Reid, 522, 519, 521.
 — *dendriticum* (Pers.) Reid, 523, 519, 521.
 — *elegans* Jungh., 524, 518, 519, 521.
 — var. *elegans*, 521.
 — var. *lamellatum* (Berk. & Curt.) Reid, 521, 525, 528.
 — *fusum* (Cooke) Reid, 520, 521, 526.
 — var. *floridanum* (Lloyd) Reid, 521, 526, 527.
 — var. *fusum*, 521, 527.
 — *lamellatum* (Berk. & Curt.) Reid, 525.
 — *plicatum* (Lloyd) Reid, 527, 519, 521.
 — *sclerotoides* (Lloyd) Reid, 528, 519, 520.
Cymbidium angolense Rchb. f., 76, 257.
Cynanchum L., 302.
 — *congestum* Vellozo, 98.
 — *vincetoxicum* (L.) Pers., 302.
 Cyperaceae : Notes on, E. Nemes, XLII, 150.
 — — — XLIII, 282.
Cyrtoptera stoltziana Kraenzl., 258.
Cyrtorchis bistorta (Rolle) Schltr., 87.
 — *hookeri* (Rolle) Schltr., 87.
 — *ringens* (Rchb. f.) Summerh., 87.
Daldinia eschscholzii (Fr.) Rehm, 153.
Dalea sect. *Urceolatae*, 159.
 — *argyrotricha* P. G. Wilson, 157.
 — *cuniculo-caudata* P. G. Wilson, 158.
 — *lagopina* (Rydb.) Gentry, 157, 158.
 — *zimapanica* S. Schauer, 158.
Dasyscyphella Tranzschel, 323.
Dasyscyphus S. F. Gray, 323.
 — *apalus* (Berk. & Broome) Dennis, 328.
 — *aurea* Massee, 323.
 — *brasilensis* (Mont.) Le Gal, 465.
 — *candida* Rodway, 327.
 — *dussii* Dennis, 328.
 — *elegantulus* (Karst.) Karst., 330.
 — *enzenspergerianus* (P. Henn.) Dennis, 330.
 — *eucalypti* (Berk.) Sacc., 324, 326.
 — *flavidulus* Rehm, 465.
 — *glabrescens* (Cooke & Phillips) Sacc., 327, 328.
 — *hyalopus* (Cooke & Massee) Dennis, 327, 328.
 — *lachnoderma* (Berk.) Rehm, 325, 326.
 — *ovina* Rodway, 344.
 — *papyraceus* (Karst.) Sacc., 465.
 — *pitzelianus* (P. Henn.) Dennis, 328, 329.
 — *pteridophyllus* Rodway, 329.
 — *pulveraceus* (Fr.), 346.
 — *pygmaeus* (Fr.) Sacc., 464.
 — *singerianus* Dennis, 465, 466.
 — *subciboria* (Rodway) Dennis, 329, 330.
 — *terrestris* (Berk. & Broome) Sacc., 342, 344.
 — *virginus* S. F. Gray, 327.
Daucus carota L., 389.
 de Laszlo, Henry G. : Library of Medicinal Plants (Rev.), 426.
Dendrostilbella baecomyioides (Massal.) Lindau, 338.
 Dennis, R. W. G. : Ascomycetes collected by Dr. R. Singer in Bolivia and North Argentina, 151.
 — Bolivian Helotiales collected by Dr. R. Singer, 458.
 — Critical Notes on some Australian Helotiales and Ostropales, 321.

- Dennis, R. W. G. : Fungi venezuelani I, 402.
 — The Genus *Zoellneria* Velenovsky, 398.
 — *Xylaria* versus *Hypoxylon* and *Xylo-sphaera*, 101.
 — and Korf, R. P. : A Japanese Species of *Sphagnicola* Velenovsky, 181.
Dennstaedtia scandens (Bl.) Moore, 455.
Deppea, *Deppea* and the lectotype species of *Lycaste*, A. A. Bullock, 253.
Deppea Cham. & Schlecht., 253.
Deppea, *Deppea* and the lectotype species of *Lycaste*, A. A. Bullock, 253.
Deppea, Raf., 253.
 — *mexicana* Raf., 253.
 Dermatitis, 'Parsnip' : Barbara J. Youngman, 387.
Dermatocalyx parviflorus Oerst., 440.
Dermea Fr., 348.
Desmogyne King & Prain, 490.
 — *angustifolia* Knagg, 492.
 — *minor* King & Prain, 491.
 — *neriifolia* King & Prain, 491.
Dianthus from Central Africa : A new species of, S. S. Hooper, 318.
Dianthus from South Africa : A Hybrid, S. S. Hooper, 515.
Dianthus bolusii Burtt Davy, 515, 517.
 — *bolusii* Burtt Davy $\times$ *caespitosus* Thunb., 515, 516, 517.
 — *caespitosus* Thunb., 515, 517.
 — *chimanimaniensis* Hooper, 318.
Diaphananthe plehniana (Schltr.) Schltr., 278, 279.
 — *suborbicularis* Summerh., 278.
Diodia cf. *physotricha* Chiov., 218.
 Director, The, 1.
Discinella terrestris (Berk. & Broome) Dennis, 342, 343.
Distictella racemosa (Bur. & K. Schum.) Urb., 431.
Distictis racemosa Bur. & K. Schum., 431, 432.
Dolichandra Cham., 420, 421.
Donaldsonia stenopetala Bak. f., 384, 385.
Dorycnium : Lotus in Africa south of the Sahara (excluding the Cape Verde islands and Socotra) and its distinction from, J. B. Gillett, 361.
Dorycnium L., 362, 363, 364.
 — *broussonetii* (DC.) Webb, 364.
 — *eriophthalmum* (Webb) Webb, 364.
 — *hirsutum* (L.) Ser., 363.
 — *quinatum* (Forsk.) C. Chr., 373.
 — *schimperi* Jaub. & Spach, 373.
 — *spectabile* (DC.) Webb, 364.
Dryopteris forsythii-majoris C. Chr., 449.
 — *opaca* (Don) C. Chr., 447.
 — *parvisora* C. Chr., 449.
- East African Herbarium : Notes from the, B. Verdcourt, V, 51.
 — — — VI, 185.
 — — — VII, 199.
 — — — VIII, 218.
 — J. B. Hutchinson and B. J. S. Lee, IX, 221.
 Easter Island and Juan Fernandez : Recent researches on the botany of, W. B. Turrill, 89.
- Eleocharis marginulata* Steud., 282.
 — *palustris* R. Br., 282.
 — *welwitschii* Nelmes, 282.
Elvella aeruginosa Oeder, 340.
Encoelia heteromera (Mont.) Nannfeldt, 152, 464.
 — *infundibuliformis* (Durand) Dennis, 464.
 — *toomansii* (Berk. & Broome) Dennis, 344, 345, 346.
 Endlicher's *Enchiridion Botanicum* of 1841, A. A. Bullock, 467.
Epidorchis burchellii (Rchb. f.) Kuntze, 264.
 — *disticha* (Lindl.) Kuntze, 261.
 — *saccifera* (Lindl.) Kuntze, 265.
 — *subulata* (Lindl.) Kuntze, 263.
Epigynium acuminatum (G. Don) Klotzsch, 483.
 Erady, N. A. and Rajappan, K. : A new species of *Oedogonium* from South India, 53.
 Ericales : XI : Studies in the, H. K. Airy Shaw, 468.
Erinella Quél., 323.
 — *hyalopoda* Cooke & Massee, 327.
 — *lutea* Phill., 321, 323.
 — *novae-zelandiae* Massee, 321, 322.
 — *pritzeliana* P. Henn., 328.
Eriopezia caesia (Fr.) Rehm, 334.
Eriosorus Féc., 450.
Eryngiophyllum pinnatisectum P. G. Wilson, 165.
 — *rosei* Greenm., 165.
Erythroxylum platycladum Boj., 218.
Euchaetothrips kroi (Schille), 301.
Eugenia aromatica (L.) Baillon, 52.
 — *caryophyllata* Thunb., 52.
 — *caryophyllum* (Sprengel) Bullock & Harrison, 52.
Eulophia angolensis (Rchb. f.) Summerh., 76, 257.
 — *antenniseipala* (Rchb. f.) Schltr., 259.
 — *bella* N. E. Br., 77.
 — *buchananii* (Rchb. f.) Bolus, 257.
 — *caricifolia* (Rchb. f.) Summerh., 259.
 — *chrysops* Summerh., 78.
 — *clitellifera* (Rchb. f.) Bolus, 81.
 — *coelogloma* Schltr., 259.
 — *compta* Summerh., 78.
 — *cristata* (Sw.) Steud., 259.
 — *elliottii* Rolfe, 80.
 — *hirschbergii* Summerh., 80.
 — *involuta* Summerh., 78.
 — *juncifolia* Summerh., 78.
 — *lindleyana* (Rchb. f.) Schltr., 258.
 — *livingstoniana* (Rchb. f.) Schltr., 259.
 — *malangana* (Rchb. f.) Summerh., 259.
 — *orthoplectra* (Rchb. f.) Summerh., 76.
 — *pentheri* Schltr., 77.
 — *pyrophila* Rchb. f., 81.
 — *ramifera* Summerh., 80.
 — *rigidifolia* Kraenzl., 259.
 — *rugulosa* Summerh., 77.
 — *schweinfurthii* Kraenzl., 77.
 — *stenoplectra* Summerh., 81.

- *stolziana* Engl., 258.
 — *warburgii* Schltr., 259.
 Evison, J. R. B. : Gardening for Display (Rev.), 399.
Exallage Brem., 97, 99.
 — *auricularia* (L.) Brem., 97.
Exobasidium Woronin, 402.
 — *emeritense* Dennis, 402, 403.
 — *leucothoes* P. Henn., 402.
 — *vaccinii* Woronin, 402.
Exolobus Fournier, 97.
 — *patens* (Decne.) Fournier, 97.
- Fauna and Flora of the Royal Botanic Gardens, Kew : XXIII : Additions to the Wild, ed. by H. K. Airy Shaw, 295.
 Ferns, with descriptions of a new genus and new species : Notes on Malaysian, R. E. Holttum, 447.
 Flora and Fauna of the Royal Botanic Gardens, Kew : XXIII : Additions to the Wild, ed. by H. K. Airy Shaw, 295.
 Flora of Tropical America : Contributions to the, P. G. Wilson, LXIII, 155.
 — N. Y. Sandwith, LXIV, 420.
 — — LXV, 427.
Forchhammeria subgenus *Helandra* Standl., 156.
 — *brevipes* Urb., 155, 156.
 — *hintonii* P. G. Wilson, 155.
 Forman, L. L., 2.
Frankliniella intonsa (Trybom), 301.
 Fungi venezuelani : I, R. W. G. Dennis, 402.
- Galega barba-jovis* Burm. f., 121.
 — *capensis* Jacq., 121.
 — *humilis* Thunb., 121.
 — *linearis* Willd., 118.
 — *pallens* Ait., 121.
 — *villosa* L., 121.
 — — Michx., 121.
Gardenia manganjæ Hiern, 51.
 Gardens : Review of the work during 1957, 15.
Gaumerocassia Britt. & Rose, 160.
Gaylussacia incurvata Griff., 485.
Gelsemium amoenum Kuntze, 432.
 — var. *pubescens* Kuntze, 432.
 — var. *tomentosum* Kuntze, 432.
 Generic names : Type species of some, A. A. Bullock, 97.
Genianthus Hook. f., 98.
 Gesneriads : a guide to the cultivated (Rev.), 96.
 Gillett, J. B. : A new subspecies of *Indigofera asparagoides*, 176.
 — Lotus in Africa south of the Sahara (excluding the Cape Verde islands and Socotra) and its distinction from *Dorycnium*, 361.
 — Notes on *Tephrosia* in Tropical Africa, 111.
 — The indumentum of the style in the taxonomy of *Tephrosia* in Africa, with notes on *T. virgata* H. M. Forbes and *T. euchroa* Verdoorn, 414.
 — *Trifolium somalense* : a clover with tuberous roots, 444.
 — and Bullock, A. A. : The typification of *Lotus schimperii*, 255.
 — and Carter, S. : *Xylocalyx* (Scrophulariaceae) in Somaliland, 359.
Gomphrena sessilis L., 172, 171.
Gonolobus Michaux, 302.
 — *erianthus* Decne., 169.
 — *gonocarpos* (Walter) Perry, 302.
 — *megalocarpus* P. G. Wilson, 168.
 — *patens* Decne., 97.
Gorgoniceps leucophaeus Speg., 466.
 Gossypium from Central Tanganyika : A New Species of, J. B. Hutchinson and B. J. S. Lee, 221.
Gossypium anomalum Wawra & Peyritsch, 221, 223.
 — *areysianum* (Defl.) J. B. Hutchinson, Silow & S. G. Stephens, 221, 222.
 — *herbaceum* L. race *africanum* (Watt) J. B. Hutchinson & Ghose, 223.
 — *longicalyx* J. B. Hutchinson & B. J. S. Lee, 221, 222, 223.
 — *somalense* (Guerke) J. B. Hutchinson, Silow & S. G. Stephens, 221, 222.
 — *stocksii* Mast., 222, 223.
Gouldia sandwicensis A. Gray, 98.
 Graham, R. A. : Notes on African Capparidaceae : I, 31.
 — — II, 177.
 — Notes on African Rosaceae : V, 107.
 Grasses : Notes on Asiatic, N. L. Bor, XXXII, 225.
 Grose, Donald : The Flora of Wiltshire (Rev.), 110.
Guardiola pappifera P. G. Wilson, 162.
Gymnogramme chrysosora Bak., 450.
 Gymnosperm Nomenclature : Notes on, R. Melville, 531.
- Habenaria ambigua* Kraenzl., 62.
 — *aurea* Kraenzl., 64.
 — *buchananiana* Kraenzl., 63.
 — *buchwaldiana* Kraenzl., 62.
 — *chlorotica* Rchb. f., 57, 58.
 — *crocea* Rchb. f., 71.
 — *depauperata* Kraenzl., 62.
 — *elegantula* Kraenzl., 70.
 — *flammea* Kraenzl., 62.
 — *guingangae* Rchb. f., 73.
 — *hologlossa* Summerh., 57.
 — *ipyanae* Schltr., 63.
 — *kitimboana* Kraenzl., 63.
 — *kilondo* De Wild., 63.
 — *montis-elgon* Schltr., 70.
 — *ochrantha* Schltr., 70.
 — *paludosa* Lindl., 64.
 — *pervillei* (Rchb. f.) Kraenzl., 62.
 — *poggeana* Kraenzl., 73.
 — *protearum* Rchb. f., 60.
 — *stolzii* Kraenzl., 63.
 — *tenuicaulis* Rendle, 62.
 — *ukingensis* Schltr., 61.
 — *wilfordii* Ridl., 64.
Haplothrips setiger Priesner, 301.
 — *subtilissimus* (Hal.), 301.
 Harper, Francis : The Travels of William Bertram (Rev.), 536.

- Harrington, H. D. : How to Identify Plants (Rev.), 446.
- Harrison, S. G. and Bullock, A. A. : The correct name for the Clove, 52.
- Hedyotis* L., 97, 99.
- *auricularia* L., 97, 99.
- *fruticosa* L., 97, 99.
- *herbacea* L., 99.
- Heliopsis parvifolia* A. Gray, 164.
- *purpurea* P. G. Wilson, 164.
- Heliopsis haemorrhoidalis* (Bouché), 296.
- Hellyer, A. G. L. (Ed.) : Amateur Gardening Annual, 1958 (Rev.), 404.
- Amateur Gardening Popular Encyclopedia of Flowering Plants (Rev.), 132.
- Garden Plants in Colour : An Amateur Gardening Encyclopedia (Rev.), 411.
- Helminthocarpon* A. Rich., 362.
- Helotiales collected by Dr. R. Singer : Bolivian, R. W. G. Dennis, 458.
- Helotiales and Ostropales : Critical Notes on some Australian, R. W. G. Dennis, 321.
- Helotium aglaesporum* Berk., 338.
- *aureum* Pers., 338.
- *brevisporum* Cooke & Phillips, 335.
- *calyculus* (Fr.) Fr., 336.
- *camerunense* P. Henn., 462.
- *carnosum* Rodway, 331.
- *ceratinum* (Berk.) Dennis, 335, 336.
- *citrinum* var. *turfaceum* (Karst.) Karst., 344.
- *gratum* (Berk.) Cooke, 336, 338.
- *guernisaci* Crouan, 183.
- *lutisedum* (Karst.) Karst., 183, 344.
- *macrosporum* Peck, 346.
- *melleum* Berk. & Broome, 183.
- *microsporum* Rodway, 332.
- *pateriforme* (Berk.) Cooke, 337, 338.
- *pezizoideum* Cooke & Phillips, 334, 335.
- *serotinum* (Fr.) Fr., 462.
- *sessile* Rodway, 348.
- *singeri* Dennis, 462, 463.
- *striatum* Rodway, 332.
- *subaurantiacum* P. Henn., 464.
- *tasmanicum* Rodway, 338.
- *terrestre* Berk. & Broome, 342.
- *uliginosum* var. *cortisedum* (Karst.) Karst., 338.
- *velhaense* (P. Henn.) Le Gal, 462.
- *virgultorum* Karst., 336.
- Hemionitis opaca* Don, 447.
- Hemipogon* Decne., 97.
- *acerosus* Decne., 97.
- Hemsley, J. H., 2.
- Hepper, F. N., 2, 3.
- Hepper, F. N. : *Sabicea* Aubl. and *Stipularia* Beauv. (Rubiaceae-Mussaendeae) in Tropical Africa, 289.
- Some additions to *Pauridiantha* and *Bertiera* (Rubiaceae) in West Tropical Africa, 405.
- Heraclium alpinum* L., 388.
- *lanatum* Michx., 387.
- *mantegazzianum* Somm. & Lev., 387.
- *sphondylium* L., 388.
- Herbarium : Review of the work during 1957, 2.
- Hercinothrips femoralis* (Reuter), 296.
- Heteromorphic Seeds : *Spergularia salina* and *Spergularia marginata* and their, E. J. Salisbury, 41.
- Hexastylis* Raf., 283.
- Hillcoat, Dorothy and Brenan, J. P. M. : The Identity of *Acacia horrida* (L.) Willd., 39.
- Himalayas : Notes on the genus *Astragalus* Linn. from W. Pakistan and N.W., S. I. Ali, 303.
- Hinton, G. B. : Identification of the collection of, 155.
- Holtum, R. E. : Notes on Malaysian Ferns, with descriptions of a new genus and new species, 447.
- Hooper, Sheila S. : A Hybrid *Dianthus* from South Africa, 515.
- A new species of *Dianthus* from Central Africa, 318.
- Hosackia* Benth., 362, 363.
- Howell, John Thomas : A Flora of San Francisco, California (Rev.), 294.
- Huber, Dr. H., 2, 3.
- Humarina* Seaver, 353.
- Hutchinson, J. B. and Lee, B. J. S. : A New Species of *Gossypium* from Central Tanganyika, 221.
- Hyalopeziza ciliata* Fuckel, 398.
- Hybrids between *Juncus inflexus* L. and *Juncus effusus* L. : On Putative, H. T. Clifford, 392.
- Hypericum : Notes on African, N. K. B. Robson, 396.
- Hypericum* sect. *Montana* Stef., 396.
- *afromontanum* Bullock, 396.
- *annulatum* Moris, 396.
- *caprifolium* Boiss., 396.
- *conjunctum* N. Robson, 397.
- *conjungens* N. Robson, 397.
- *lusitanicum* Poir., 396.
- *pubescens* Boiss., 396.
- *somaliense* N. Robson, 396.
- *tomentosum* L., 396.
- Hypolepis bivalvis* v.A.v. R., 454.
- *brooksiae* v.A.v.R., 455.
- Hypoxylon and Xylosphaera : *Xylaria* versus, R. W. G. Dennis, 101.
- Hypoxylon anisopleura* Mont., 102.
- *anthracoderma* Speg., 153.
- *comosum* Mont., 103.
- *cornutum* (Hoffm.) Mérat, 101.
- *cubense* Mont., 103.
- *dichotomum* Mont., 103.
- *digitatum* (L.) Mérat, 101.
- *grammicum* Mont., 103.
- *guyanense* Mont., 104.
- *hyperythrum* Mont., 104.
- *mellissii* Berk., 104.
- *microceras* Mont., 104.
- *militare* (L.) Mérat, 101, 102.
- *polymorphum* (Pers.) Mérat, 101.
- *radicosum* (Bull.) Mérat, 101.
- *rhizocola* Mont., 105.
- *rhizomorpha* Mont., 105.
- *xanthino-velutinum* Mont., 104.

- Hysteropezizella dianellae* Dennis, 354, 355.
- Illecebrum achyrantha* L., 174.
 — *peplodes* Roem. & Schult., 175.
 — *pungens* (H.B.K.) Spreng, 174.
 — *sessile* L., 172, 171.
- Index Kewensis—a correction, A. A. Bullock, 514.
- Indian grasses : *Indopoa* Bor, a new genus of, N. L. Bor, 225.
- Indigofera asparagoides : A new sub-species of, J. B. Gillett, 176.
- Indigofera asparagoides* Taub. subsp. *ephemera* Gillett, 176.
- Indopoa* Bor, 225.
 — *pauperula* (Stapf) Bor, 226.
- International Botanical Congress : Ninth, 38.
- Ipomoea* L., 199.
 — sect. *Dasychaetia* Hallier f., 205.
 — *acutiflora* A. Rich., 209.
 — *afra* Choisy, 210.
 — *alpina* Rendle, 205.
 — *arachnosperma* Welw., 207.
 — *argentaurata* Hallier f., 207.
 — *aspericaulis* Bak., 212.
 — *asperifolia* Hallier f., 202.
 — *auxocalyx* Pilger, 204.
 — *barteri* Bak., 202.
 — *biloba* Forsk., 211.
 — *blepharophylla* Hallier f., 202.
 — *blepharosepala* A. Rich., 205.
 — *brittaniana* Rendle, 209.
 — *buchanani* Bak., 189.
 — *cairicae* (L.) Sweet, 214.
 — *camporum* Hutch. & Dalz., 208.
 — *cardiosepala* Choisy, 204, 200, 205.
 — *chrysosperma* Hallier f., 217.
 — *citrina* Hallier f., 217.
 — *commatophylla* A. Rich., 200.
 — var. *angustifolia* Oliv., 200.
 — *convolvuloides* Hallier f., 203.
 — *optica* (L.) Roem. & Schult., 201, 212.
 — var. *acuta* Choisy, 213.
 — var. *siphonantha* Hallier f., 213.
 — *crassipes* Hook. var. *hirta* Hallier f., 202.
 — *crepidiformis* Hallier f. var. *microcephala* (Hallier f.) Verdcourt, 207.
 — *cynanchifolia* C. B. Cl., 200.
 — *dasyclada* Pilger, 211.
 — *dasyperma* Jacq., 214.
 — var. *odontosepala* (Bak.) Verdcourt, 214.
 — *debeerstii* De Wild., 203.
 — *decorsei* A. Chev., 207.
 — *dehniae* Merxm., 202.
 — *delpierrei* De Wild., 206.
 — *demissa* Hallier f., 210.
 — *dendroidea* Choisy, 190.
 — *elythrocephala* Hallier f., 207.
 — *eriocarpa* R. Br., 200.
 — *falcata* R. E. Fries, 207.
 — *ficifolia* Lindl. var. *laxiflora* Hallier f. subvar. *parviflora* Hallier f., 207.
 — *floccosa* Vatke, 195.
 — *fragilis* Choisy, 209.
 — var. *pubescens* Hallier f., 209.
 — *fulvicaulis* (A. Rich.) Hallier f., 202.
 — *garckeana* Vatke, 207.
 — *gossypina* Hallier f., 210, 215.
 — *hamingtoni* (Bak.) Rendle, 215.
 — *hardwickii* (Spreng.) Sweet, 204, 205.
 — *hellebarda* Hallier f., 208, 209.
 — *heterocalyx* Schulze-Menz, 202.
 — *heterophylla* R. Br., 200.
 — *hierniana* Rendle, 189.
 — *hildebrandtii* Vatke, 189.
 — *hindeana* Rendle, 203.
 — *hockii* De Wild., 205.
 — *hornei* Bak., 213.
 — *hypoxantha* Hallier f., 202.
 — *hystrix* Hallier f., 211.
 — *inconspicua* Bak., 209.
 — *involutrata* P. Beauv., 206.
 — var. *burtii* Verdcourt, 206, 207.
 — var. *involutrata*, 207, 206.
 — var. *operosa* (C. H. Wright) Verdcourt, 206, 207.
 — *irwiniae* Verdcourt, 214.
 — *kassneri* Pilger, 207.
 — *kentrocarpa* A. Rich., 210.
 — *kilimandschari* Dammer, 207.
 — *kituiensis* Vatke var. *massaiensis* (Pilger) Verdcourt, 216.
 — *kotschyana* Choisy, 200, 201.
 — *lachnosperma* Choisy, 195.
 — *lapathifolia* Hallier f., 209.
 — var. *dasyclada* (Pilger) Verdcourt, 211.
 — *latisepala* E. A. Bruce, 217.
 — *ledermannii* Pilger, 202.
 — *liliiiflora* R. E. Fries, 215.
 — *linosepala* Hallier f., 205.
 — *longipes* Engl., 209.
 — *lutambensis* Schulze-Menz, 188.
 — *luteola* R. Br., 209.
 — *macrocalyx* (Bak.) Hallier f., 215.
 — var. *decalvata* Hallier f., 215.
 — *macrosepala* Brenan, 215.
 — *massaiensis* Pilger, 216.
 — *maxima* (L.f.) Sweet, 209.
 — var. *sagittata* Verdcourt, 209.
 — *micrantha* Hallier f., 210.
 — var. *hispida* Hallier f., 210.
 — *microcephala* Hallier f., 207.
 — *milnei* Verdcourt, 203.
 — *morsoni* Bak., 200.
 — *multinervia* Verdcourt, 212.
 — *nephrosepala* Chiov., 217.
 — *obscura* (L.) Ker Gawl., 208, 209, 210, 211, 215.
 — var. *sagittifolia* Verdcourt, 210.
 — *ochracea* (Lindl.) G. Don, 210.
 — G. Don, 209.
 — *odontosepala* Bak., 214.
 — *oenothera* (Vatke) Hallier f. var. *angustifolia* (Oliv.) Verdcourt, 200.
 — *operosa* C. H. Wright, 206.
 — *ophthalmantha* Hallier f., 210.
 — *pes-caprae* subsp. *brasiliensis* (L.) Oost-stroom, 211.
 — subsp. *pes-caprae*, 211.
 — *pes-tigridis* L., 199.
 — *petiolulata* Schulze-Menz, 213.
 — *pharbitiformis* Bak., 208.
 — *pileata* Roxb., 206, 207.

- Ipomoea pilosa* (Roxb.) Sweet, 207.
 — *plebeia* R. Br. subsp. *africana* Meeuse, 199.
 — subsp. *indica* Verdcourt, 200.
 — *polymorpha* Roem. & Schult., 200, 201.
 — *porrecta* Rendle & Britten, 202.
 — *pringsheimiana* (Dammer) Rendle, 189.
 — *prismatosypho* Welw., 215.
 — var. *trifida* Verdcourt, 214.
 — *riparia* Don, 208.
 — *saccata* Hallier f., 214.
 — *schomburgkii* Choisy, 212.
 — *scotelli* Rendle, 202.
 — *semisecta* Merxm., 212.
 — *shirambensis* Bak., 215.
 — *sinensis* (Desr.) Choisy, 204.
 — subsp. *blepharosepala* (A. Rich.) Meeuse, 205, 200.
 — *stenophyton* Chiov., 188.
 — *stolonifera* (Cyrill.) J. F. Gmel., 211.
 — *sultani* Chiov., 216.
 — *tenuirostris* Choisy, 208.
 — subsp. *hindeana* (Rendle) Verdcourt, 203.
 — subsp. *repens* Verdcourt, 203.
 — *tessmannii* Pilger, 215.
 — *ticcoba* Verdcourt, 213, 201.
 — *transvaalensis* Meeuse, 203.
 — *trichocalyx* Schumach. & Thonn., 210.
 — *triflora* Forsk., 215, 210.
 — *tuba* (Schlecht.) G. Don., 216.
 — *velutina* R. Br., 189.
 — *velutipes* Rendle, 208.
 — *venosa* (Desr.) Roem. & Schult., 213.
 — *verbascoides* Choisy, 215.
 — *verdickii* De Wild., 208.
 — *verticillata* Forsk., 200.
 — *welwitschii* Hallier f., 211, 212.
 — var. *latifolia* Britten, 211.
 — *whyteana* Rendle var. *integrata* Chiov., 207.
 — *wightii* (Wall.) Choisy, 207, 208.
 — var. *kilimandschari* (Dammer) Verdcourt, 207.
Isola J. Sm., 451.
- Jacaranda atropurpurea* Rusby, 434.
 — *cauliflora* Bur. & K. Shum., 434.
 — *glabra* (DC.) Bur. & K. Schum., 434.
 — *intermedia* Huber, 434.
 — Sonder, 434.
 — *longiflora* Rusby, 434.
 — *rachidoptera* Bur. & K. Schum., 434.
Jacquemontia hastigera Bojer, 186.
Jambosa aromatica Miquel, 52.
 — *caryophyllus* (Sprengel) Niedenau, 52.
 Japanese Species of *Sphagnicola* Velenovsky : A. R. W. G. Dennis and R. P. Korf, 181.
 Jeffrey, C., 2.
 Jodrell Laboratory : Review of the work during 1957, 13.
 Jones, E. Morley : Outdoor Chrysanthemums for garden and exhibition (Rev.), 96.
 Juan Fernandez and Easter Island : Recent researches on the botany of, W. B. Turrill, 89.
- Juncus inflexus* L. and *Juncus effusus* L. : On Putative Hybrids between, H. T. Clifford, 392.
Juncus bufonius L., 220.
 — *diffusus* Hoppe, 392, 393.
 — *effusus* L., 392, 393, 394.
 — var. *compactus* Lej. & Court., 392, 393.
 — *inflexus* L., 392, 393, 394.
Juniperus coxii A. B. Jacks., 533.
 — *recurva* Buch.-Ham., 533.
 — var. *coxii* (A. B. Jacks.) Melville, 533.
- Kadua* Cham. & Schlecht., 97.
 — *affini* Cham. & Schlecht., 98.
 — *cookiana* Cham. & Schlecht., 97.
 Keay, R. W. J., 3.
 Kew : Additions to the Wild Fauna and Flora of the Royal Botanic Gardens : XXIII, ed. by H. K. Airy Shaw, 295.
Kissenia spathulata T. Anders., 219.
 Korf, R. P. and Dennis, R. W. G. : A Japanese Species of *Sphagnicola* Velenovsky, 181.
Kretzschmaria coenopus (Fr.) Sacc., 153.
 — *guaranitica* Speg., 104.
- Lachnella celandarii* Hansford, 324, 326.
Lachnum elzenspergerianum P. Henn., 330.
 — *lachnodermum* (Berk.) Hahn & Ayers, 326.
Laguncularia racemosa (L.) Gaertner f., 37.
Lambertella boliviiana Dennis, 458, 459.
 — *jasmini* Seaver & Whetzel, 459.
Lamprospora cec'hqueraultii (Crouan) Boudier, 151.
Landolphia comorensis K. Schum., 391.
 — var. *florida* (Benth.) K. Shum., 391.
 — *florida* Benth., 391.
 — sect. *Saba* Pichon, 391.
Lasiohelonium Sacc., 323.
 Lee, B. J. S. and Hutchinson, J. B. : A New Species of *Gossypium* from Central Tanganyika, 221.
Lepervenchea Cordem., 269.
 Lewis, J., 2.
 Lewis, Patricia : British Wild Flowers (Rev.), 397.
 Library : Review of the work during 1957, 10.
Limodorum imbricatum Sw., 261.
Limothrips cerealium Hal., 298.
 — *denticornis* Hal., 298.
Lindsaea ensifolia Sw., 451.
Lissochilus angolensis (Rchb. f.) Rchb. f., 76, 257.
 — *antenniseptalus* Rchb. f., 259.
 — *antunesii* Rolfe, 257.
 — *aurantiacus* Rchb. f., 78.
 — *bellus* (N. E. Br.) Schltr., 77.
 — *buchananii* Rchb. f., 257.
 — *descampsii* De Wild., 78.
 — *elegantulus* Schltr., 78.
 — *elysii* Rendle, 258.
 — *holubii* Rolfe, 78.
 — *johnstonii* Rolfe, 78.

- *katentaniensis* De Wild., 258.
 — *kraenzlinii* Rolfe, 77.
 — *latus* Rolfe, 257.
 — *lindleyanus* Rchb. f., 257.
 — *longifolius* sensu Lindl., 257.
 — *malanganus* Rchb. f., 259.
 — *mechowii* Rchb. f., 77.
 — *milanyianus* Rendle, 77.
 — *mildbraedii* Kraenzl., 258.
 — *monticola* Rendle, 77.
 — *orthoplectrus* Rchb. f., 77.
 — *paludicola* Rchb. f., 257.
 — *platypterus* Rchb. f., 257.
 — *pulcher* Schltr., 77.
 — *saccatus* Rendle, 77.
 — *smithii* Rolfe, 77.
 — *stolzianus* (Kraenzl.) Schltr., 258.
 — *ugandae* Rolfe, 258.
 — *validus* Rendle, 257.
 — var. *minor* Rendle, 257.
 — *vermiculatus* De Wild., 78.
Listrostachys bistorta (Rolfe) Rolfe, 87.
 — *clavata* Rendle, 268.
 — *hookeri* Rolfe, 87.
 — *ignoti* Kraenzl., 87.
 — *ringens* Rchb. f., 87.
 — *subulata* (Lindl.) Rchb. f., 263.
 Lloyd, Christopher : The Mixed Border (Rev.), 95.
 Lloyd, L. C., and Rutter, E. M. : Hand-list of the Shropshire Flora (Rev.), 390.
Lopharia papyracea (Jung.) Reid, 530.
 Lotus in Africa south of the Sahara (excluding the Cape Verde islands and Socotra) and its distinction from *Dorycnium*, J. B. Gillett, 361.
 Lotus schimperii : The typification of, J. B. Gillett and A. A. Bullock, 255.
Lotus sect. *Canaria* Rikli, 364.
 — subgenus *Canaria* (Rikli) Gillett, 364.
 — *Edentolotus* Brand, 378.
 — *Lotus*, 378, 379.
 — *Pedrosia* (Lowe) Brand, 379.
 — *arabicus* L., 375, 361, 362, 374.
 — var. *glabrescens* Schweinf., 374.
 — var. *torulosus* Chiov., 375.
 — var. *trigonelloides* (Webb) Webb, 375.
 — *arenarius* Brot., 367.
 — *assakensis* Brand, 379.
 — *becquetii* Boutique, 368, 369.
 — *brachycarpus* A. Rich., 373.
 — var. *cuscutae* Schweinf., 374.
 — var. *lalambensis* (Schweinf.), Brand, 374.
 — var. *major* Brand, 374.
 — var. *menachensis* Schweinf., 373.
 — var. *montanus* (A. Rich.) Cufod., 373, 377.
 — *brandianus* Harms, 371.
 — *broussonetii* DC., 364.
 — *chazaliei* Boissieu, 367.
 — *coimbreensis* Willd., 378.
 — *corniculatus* L., 361, 364, 367.
 — var. *eremanthus* Chiov., 364, 367, 368, 372.
 — subsp. *major* (Scop.) Gams, 365, 368.
 — var. *major* (Scop.) Brand, 368.
 — subsp. *tenius* (Kit.) Briq., 368.
 — *discolor* E. Mey., 371, 361, 370, 372.
 — var. *cacondensis* Bak. f., 371.
 — subsp. *discolor*, 371.
 — var. *microcarpus* Brand, 369.
 — subsp. *mollis* Gillett, 371, 372.
 — *ehrenbergii* Vierhapper, 376, 378.
 — *eriophthalmus* Webb, 364.
 — *eylesii* Bak. f., 372.
 — *fresiorum* Harms, 367.
 — *garcinii* DC., 379.
 — *glinoides* Del., 375, 376, 377, 378.
 — *goetzei* Harms, 369, 361, 363, 370, 372.
 — *hebecarpus* Gillett, 377, 378.
 — *hebranicus* Brand, 374.
 — *jacobaeus* L., 367.
 — *jaegeri* Harms, 369, 370.
 — *jolyi* Batt., 367.
 — var. *eriocarpus* Maire, 367, 379.
 — *kilimanjaricus* Bak. f., 369, 370.
 — *lalambensis* Schweinf., 374, 373.
 — *lamprocarpus* Boiss., 368.
 — *lebrunii* Boutique, 369.
 — *loweanus* Webb, 378, 379.
 — *mearnsii* De Wild., 367.
 — *major* Scop., 368.
 — *minor* (C. H. Wright) Bak. f., 371.
 — *mlanjeanus* Gillett, 371.
 — *montanus* A. Rich., 373, 377.
 — *mossamedensis* Bak., 375.
 — *namulensis* Brand, 372, 371.
 — *nubicus* Bak., 377, 379.
 — var. *montanus* (A. Rich.) Bak., 373.
 — *nyikensis* Bak. f., 369.
 — *oehlerii* Harms, 369, 370.
 — *oxyphyllus* Harms, 372.
 — *palustris* Willd., 368.
 — *quinatus* (Forsk.) Gillett, 363, 373.
 — var. *brachycarpus* (A. Rich.) Gillett, 373, 363, 374.
 — var. *montanus* (A. Rich.) Gillett, 373.
 — var. *quinatus*, 373.
 — *roseus* Forsk., 375.
 — *roudairei* Bonnet, 363.
 — *schimperii* Steudel, 376, 255, 256, 367, 377, 378.
 — *schoelleri* Schweinf., 367, 368.
 — *spectabilis* DC., 364.
 — *stocksii* Boiss., 379.
 — *subdigitatus* Boutique, 373.
 — *tigrensis* Bak., 368, 371.
 — *torulosus* (Chiov.) Fiori, 367, 375, 378.
 — *trichocarpus* Lag., 378.
 — *trigonelloides* Webb, 375.
 — *wildii* Gillett, 370, 372.
 Lycaste : *Deppea*, *Deppia* and the lecto-type species of, A. A. Bullock, 253.
Lycaste Lindl., 253.
 — *deppei* (Lindl.) Lindl., 254.
 — *macrophylla* (Poeppig) Lindl., 253, 254.
 — *plana* Lindl., 253, 254.
Lysimachia africana Engl., 142, 145.
 — *parviflora* Bak., 142, 145.
 — *ruhmerriana* Vatke, 142, 145.
 — *saganeitensis* Knuth, 142, 145.

- Lysimachia volkensii* Engl., 144, 145.
 — *woodii* Knuth, 142, 145.
- Macfadyena bangii* Rusby, 434.
 — *corymbosa* (Vent.) Griseb., 435.
 — *violacea* Rusby, 435.
- Macroplectrum clavatum* (Rendle) Finet, 268.
 — *distichum* (Lindl.) Finet, 261.
- Malaya : A New Species of *Thelephora* from, Derek A. Reid, 227.
- Malaysian Ferns, with descriptions of a new genus and new species : Notes on, R. E. Holttum, 447.
- Mangroves : Key to West Indian, W. T. Stearn, 33.
- Mansoa difficilis* (Cham.) Bur. & K. Schum., 433.
- Marsdenia mexicana* Decne., 168, 169.
- Martinella obovata* (H.B.K.) Bur. & K. Schum., 428.
- Maxillaria deppei* Lindl., 253.
 — *deppii* Loddiges, 253.
 — *macrophylla* Poeppig, 253.
- McKelvey, Susan Delano : Botanical Exploration of the Trans-Mississippi West, 1790-1850 (Rev.), 184.
- McQuown, F. R. : Intelligent Gardening : A practical guide to labour-saving methods (Rev.), 406.
- McVaugh, Rogers : Flora of Peru [Myrtaceae] (Rev.), 536.
- Megaclinium oxyodon* Rehb. f., 75.
- Melanodiscus africanus* Radlk., 219.
- Melville, R. : Contributions to the Flora of Australia : V. The identity of *Calandrinia polyandra* Benth., 400.
 — Notes on *Alternanthera*, 171.
 — Notes on *Gymnosperm* Nomenclature, 531.
- Memora* sect. *pharseophora* K. Schum., 435, 436.
 — *adenophora* Sandw., 435.
 — *flavida* Bur. & K. Schum., 439.
 — *fulgens* K. Schum., 420, 423, 424, 425, 426.
 — var. *elongata* Bur., 420, 424, 425, 426.
 — *longilinea* A. Sampaio, 435, 436.
 — *schomburgkii* (DC.) Miers, 425, 426.
 — *valida* K. Schum., 439.
- Merremia* Hallier f., 185.
 — *alatipes* Dammer, 186.
 — *ampelophylla* Hallier f., 186.
 — subsp. *obtusa* Verdcourt, 187.
 — *angustifolia* (Jacq.) Hallier f. var. *alatipes* (Dammer) Rendle, 186.
 — *cliffordii* Hutch. & Bruce, 187.
 — *dissecta* (Pers.) Hallier f., 187.
 — *guerichiana* Hallier f., 186, 187.
 — *hemmingiana* Verdcourt, 187.
 — *medium* (L.) Hallier f., 186.
 — *multisecta* Hallier f., 187.
 — *peltata* (L.) Merr., 185.
 — *semisagitta* (Peter) Dandy, 188.
 — *stellata* Rendle, 185.
 — *subpalmata* Verdcourt, 188.
 — *tomentosa* (Choisy) Hallier f., 190.
 — *tridentata* (L.) Hallier f. subsp.
- alatipes* (Dammer) Verdcourt, 186.
 — *umbellata* (L.) Hallier f., 186.
 — *vitifolia* (Burm. f.) Hallier f., 187.
- Merulius sordidus* Berk. & Curt., 530.
- Microcoelia ericoma* Summerh., 281.
 — *stolzii* (Schltr.) Summerh., 281.
- Microsechium helleri* (Peyr.) Cogn., 161.
 — *hintonii* P. G. Wilson, 161.
 — *palmatum* (Ser.) Cogn., 161.
- Microspermum* Lag., 166.
 — *debile* Benth., 167.
 — *flaccidum* P. G. Wilson, 167.
 — *numulariaefolium* Lag., 166.
 — *tenue* P. G. Wilson, 166.
- Midotiopsis bambusicola* P. Henn., 464.
- Miehe, von Hugo : Taschenbuch der Botanik (Rev.), 456, 536.
- Millstead, Muriel F. : Growing African Violets in the Home (Rev.), 30.
- Mimosa horrida* L., 40.
 — *latronum* L.f., 40.
- Mimosoideae : Notes on, J. P. M. Brenan, V, 407.
 — — — — — VI, 409.
 — — — — — VII, 412.
- Miradoria sartorii* Benth., 167.
- Mollisia carneo-alba* Rodway, 353.
 — *ellipsospora* Rodway, 350, 351.
 — *notofagi* Rodway, 332.
 — *ochronigra* Rodway, 351.
 — *subglobosa* Rodway, 353, 354.
 — *sublividula* (Nyl.) Sacc., 349.
 — *undulata* Rodway, 352.
 — *verrucosa* Rodway, 337.
- Monixus aporum* Finet, 262.
- Moore, Harold E. : African Violets, Gloxinias and their relatives (Rev.), 96.
- Moringa—a Correction, B. Verdcourt, 384.
- Moringa aptera* Gaertn., 384.
 — *hildebrandtii* Engl., 385.
 — *longituba* Engl., 385.
 — *oleifera* Lam., 385, 386.
 — *perezgrana* (Forsk.) Fiori, 384.
 — *ruspoliana* Engl., 385.
 — *stenopetala* (Bak. f.) Cuf., 385.
 — *streptocarpa* Chiov., 384, 385.
- Morison, Guy D. : The Thysanoptera of Kew Gardens, 295.
- Mulligan, B. O. : Maples Cultivated in the United States and Canada (Rev.), 381.
- Munday, Mrs. K., 2.
- Murbeckia haitiensis* Urb. & Ekm., 156.
- Museums of Economic Botany : Review of the work during 1957, 11.
- Myrtus aromaticus* Salisbury, 52.
 — *caryophyllus* Sprengel, 52.
- Mystacidium angustum* Rolfe, 268.
 — *arthrophyllum* Kraenzl., 262.
 — *astroarche* (Ridl.) Rolfe, 275.
 — *clavatum* (Rendle) Rolfe, 268.
 — *distichum* (Lindl.) Pfitz., 261.
 — — — var. *grandifolium* De Wild., 261.
 — *infundibulare* (Lindl.) Rolfe, 275.
 — *keniae* (Kraenzl.) Rolfe, 271.
 — *verrucosum* (Rendle) Rolfe, 276.
 — *viride* Ridl., 273.

- Nectaropetalum carvalhoi* Engl., 218.
 — *kaessneri* Engl., 218.
 Nelmes, E.: Notes on Cyperaceae :
 XLII, 150.
 — — — XLIII, 282.
Nemacyclus gilvus Rodway, 356, 357.
Neophysopus orchidaceus (Bagnall), 296.
Nephrodium oosorum Bak., 448.
 — *unifurcatum* Bak., 449.
Nephrolepis falcata (Cav.) C. Chr., 454.
 Nomenclatural Notes, A. A. Bullock and
 S. G. Harrison, IV, 52.
 — A. A. Bullock, V, 88.
 — — — VI, 97.
 — — — VII, 109.
 — — — VIII, 253.
 — J. B. Gillett and A. A. Bullock, IX,
 255.
 — A. A. Bullock, X, 302.
 — — — XI, 391.
 Nomenclature : Notes on Gymnosperm,
 R. Melville, 531.
 Notopleura (Rubiaceae) : On the typi-
 fication of the generic name, A. A.
 Bullock, 88.
Notopleura (Benth.) Brem., 88.
 — *marginata* (Benth.) Bullock, 88.
 — *uliginosa* (Swartz) Brem., 88.
Ochroglossum fumosum (Peck) Imai, 458.
 — *rufum* (Schw.) Imai, 458.
Octospora S. F. Gray, 353.
Odontosoria aculeata (L.) J. Sm., 455.
Odontotecomia Bur. & K. Schum., 420, 421.
 — *fulgens* (DC.) Bur. & K. Schum.,
 420, 421, 423, 425, 426.
Odontothrips ulicis (Hal.), 299.
 Oedogonium from South India : A new
 species of, N. A. Erady and K. Rajappan,
 53.
Oedogonium confertum Hirn., 53.
 — *dioicum* Carter, 53.
 — *keralense* Erady & Rajappan, 55.
 — *perspicuum* Hirn., 53.
Oenanthe crocata L., 389.
Okenia hypogaea Cham. & Schlecht., 169.
 — *parviflora* P. G. Wilson, 169.
 Oldenlandia from East Africa : Two New
 Species of, C. E. B. Bremekamp, 382.
Oldenlandia bullockii Brem., 382.
 — *corymbosa* L., 99.
 — *eludentem* Brem., 383.
 — *marginata* Brem., 383.
 — *oxycoccoides* Brem., 382.
 — *somalae* Chiov., 383.
 — *umbellatum* L., 383.
 — *verticillata* Brem., 382.
Ombrophila Fr., 181.
 — *baumleri* Rehm, 461.
 — *umbonata* (Pers.) Karst., 183.
Onohualcoa helicocalyx (Kuntze) Sandw.,
 441.
Ononis aucheri Jaub. & Spach, 379.
 — *quinata* Forsk., 373.
Operculina turpethum (L.) Manso, 218.
Orbilia epipora (Nyl.) Karst., 465.
 — cf. *juruenensis* P. Henn., 465.
 Orchids : African, V. S. Summerhayes,
 XXV, 57.
 — — — — XXVI, 257.
Orthosia Decne., 98.
 — *congesta* (Vellozo) Decne., 98.
 Ostropales and Helotiales : Critical Notes
 on some Australian, R. W. G. Dennis,
 321.
Pachydisca Boud., 183, 344.
 — *nobilis* (Vel.) Le Gal, 183, 344.
 — *umbilicata* Le Gal, 183, 344.
Pachyptera kerere (Aubl. emend. Splitg.)
 Sandw., 430.
Pachystigma zeyheri Sonder, 98.
Paesia, St. Hil., 454.
 — *elmeri* Copel., 454, 455.
 — *lamiana* v.A.v.R., 454.
 — *luzonica* Christ, 454.
 — *radula* (Bak.) C. Chr., 454.
 — *viscosa* St. Hil., 454.
 Pakistan, W., and N.W. Himalayas :
 Notes on the genus *Astragalus* Linn.
 from, S. I. Ali, 303.
Pamphlethantha viridiflora (Hiern) Brem., 405.
Parabignonia Bur., 420, 421.
Paracarpaea Pichon, 433.
Parafrankliniella verbasci Priesner, 301.
Parathyrium Holtt., 448.
 — *boryanum* (Willd.) Holtt., 448, 449.
 — *forsythii-majoris* (C. Chr.) Holtt., 449.
 — *macdonellii* (Bedd.) Holtt., 449.
 — *parvisorum* (C. Chr.) Holtt., 449.
 — *plerorachis* (Chr.) Holtt., 449.
 — *unifurcatum* (Bak.) Holtt., 449.
 — *viridifrons* (Makino) Holtt., 449.
Paronychia achyrantha (L.) Desf., 174.
 "Parsnip" Dermatitis, Barbara J. Young-
 man, 387.
Parthenothrips dracaenae (Heeger), 296.
Pastinaca sativa L., 388, 389.
 — *urens* Requien, 388, 389.
 Pauridiantha and Bertiera (Rubiaceae)
 in West Tropical Africa : Some
 additions to, F. N. Hepper, 405.
Pauridiantha floribunda (K. Schum. &
 K. Krause) Brem., 405.
 — *stipulosa* (Hutch. & Dalz.) Hepper,
 405.
 — *viridiflora* (Hiern) Hepper, 405.
 — *ziamaeana* (Jacques-Félix) Hepper,
 405.
Peltigeromyces microsporus Möller apud
 Schimper, 463, 464.
Penaea sarcocolla L., 109.
 — *squamosa* L., 109.
 — *tetragona* Bergius, 109.
 Penaceae : A new generic name in,
 A. A. Bullock, 109.
Pennisetum atrichum Stapf & Hubbard, 218.
Pentaloncha stipulosa (Hutch. & Dalz.)
 Brem., 405.
Pentanisia microphylla (Franch.) Chiov.,
 219.
Pentapterygium flavum Hook. f., 488, 490.
 — *hookeri* C. B. Cl., 485, 486, 490.
 — *listeri* C. B. Cl., 488.
 — *scortechinii* King & Gamble, 512.
 — *serpens* (Wight) Klotzsch, 499.
 — *sikkimense* W. W. Smith, 489.

- Periconia byssoides* Schw., 467.
Perrotia aurea (Masse) Dennis, 322, 323.
——— *flammea* (Fr.) Boud., 324.
——— *lutea* (Phill.) Dennis, 321, 322.
Petalostemon obrensisformis Rydb., 159.
——— *tripetalus* P. G. Wilson, 159.
Petastoma broadwayi Sprague & Riley, 437.
——— *cuneifolium* (DC.) Bur. & K. Schum., 436.
——— *discocalyx* Bur. & K. Schum., 436, 437.
——— *laurifolium* Kraenzl., 430.
——— *leucopogon* (Cham.) Bur., 437.
——— *multiglandulosum* Kraenzl., 430.
——— *pentstemonoides* (Kraenzl.) Sandw., 437.
Peterson, B.: A New Species of the Genus *Struthiola* (Thymelaeaceae), 319.
Peucedanum galbanum Benth. & Hook.f., 389.
Pezicula sessilis (Rodway) Dennis, 348.
Peziza aeruginascens Nyl., 340.
——— *byssigena* Berk., 338.
——— *ceratina* Berk., 336.
——— *chlora* Schwein., 341.
——— *crocitincta* Berk. & Curt., 341.
——— *epitephra* Berk., 333.
——— *eucalypti* Berk. apud Hooker, 324.
——— *firma* Fr., 346.
——— *flammea* Fr., 323.
——— *glabrescens* Cooke & Phillips, 327.
——— *grata* Berk., 336.
——— *lachnoderma* Berk. apud Hooker, 326.
——— *lanariceps* Cooke & Phillips, 326.
——— *merinaskuensis* Karst., 183.
——— *obstricta* Karst., 183.
——— *pateriformis* Berk., 337.
——— *pomicolor* Berk. & Rav., 342.
——— *rufo-olivacea* Fr., 344.
——— *sublividula* Nyl., 349, 350.
——— *umbonata* Pers., 183.
Pezizella crocitincta (Berk. & Curt.) Sacc., 341, 342.
——— *notofagi* (Rodway) Dennis, 331, 332.
——— *parile* (Karst.) Dennis, 338.
——— *punctoidea* (Karst.) Rehm, 332.
Phaca hoffmeisteri Klotzsch, 304.
Phaedropezia epispertia (Berk. & Broome) Le Gal, 151.
——— *flavida* (Berk. & Curt.) Le Gal, 151.
Phaeociboria von Höhnelt, 344.
——— *flavum* Kanouse, 344.
——— *sejournei* (Boud.) von Höhnelt, 343, 344.
Phaeohelotium Kanouse, 183.
——— *flavum* Kanouse, 344.
——— *recurvum* (Rodway) Dennis, 339.
Phaeopezia ochracea Masse & Rodway, 342.
Phialea Boudier, 321.
——— *byssigena* (Berk.) Sacc., 338.
——— *ceratina* (Berk.) Sacc., 336.
——— *cyathoidea* (Fr.) Gill., 336.
——— *epitephra* (Berk.) Dennis, 333.
——— *subciboria* Rodway, 329.
——— *uleana* Rehm, 461.
Philammos subulatus (Pallas) Stev., 316.
Phillipsia dochmia (Berk. & Curt.) Seaver, 152.
——— *domingensis* (Berk.) Berk., 152.
Phryganocydia corymbosa (Vent.) K. Schum., 434, 435.
Phylacia sagraeana (Mont.) Mont., 153.
Phyllactinia grantii Oliv., 220.
Picea amabilis Forbes, 533.
——— *grandis* Loudon, 532.
Pinus clusiana Clementi, 533.
——— *grandis* Lambert, 531, 532.
——— *laricio* Poir., 534.
——— *nigra* Arnold, 533, 534.
——— var. *calabrica* (Loud.) Schneid., 534.
——— var. *maritima* (Aiton) Melville, 534.
——— *pinaster* Ait., 534.
——— *sylvestris* L., 533.
——— var. *maritima* Aiton, 534.
Piriadacus erubescens (DC.) Pichon, 433.
——— *hibiscifolius* (Cham.) Pichon, 433.
Pityranthus crassifolius Mart., 174.
Plantae Hintonianae: XII, P. G. Wilson, 155.
Platanthera bifolia (L.) Rich., 257.
Platycooryne Rchb.f., 58.
——— *affinis* Summerh., 61.
——— *ambigua* (Kraenzl.) Summerh., 62.
——— *aurea* (Kraenzl.) Rolfe, 64.
——— *brevirostris* Summerh., 68, 257.
——— *buchananiana* (Kraenzl.) Rolfe, 63.
——— *crocea* (Rchb. f.) Rolfe, 71.
——— *elegantula* (Kraenzl.) Summerh., 70.
——— *grandiflora* Summerh., 65.
——— *guingangae* (Rchb. f.) Rolfe, 73.
——— *heterophylla* Summerh., 69.
——— *kitondo* (De Wild.) Summerh., 63.
——— *latipetala* Summerh., 64.
——— *macroceras* Summerh., 66.
——— *mediocris* Summerh., 72.
——— *megalorrhyncha* Summerh., 63.
——— *micrantha* Summerh., 71.
——— *montis-elson* (Schltr.) Summerh., 70.
——— *ochrantha* (Schltr.) Summerh., 70.
——— *paludosa* (Lindl.) Rolfe, 64.
——— *pervillei* Rchb. f., 62, 58.
——— *poggeana* (Kraenzl.) Rolfe, 73.
——— *protearum* (Rchb. f.) Rolfe, 60.
——— *tenuicaulis* (Rendle) Rolfe, 62.
——— *trilobata* Summerh., 67.
——— *ukingensis* (Schltr.) Summerh., 61.
——— *wilfordii* (Ridl.) Rolfe, 64.
Pleonotoma auriculata Sprague, 438.
——— *brittonii* Rusby, 437, 438.
——— *castelnaei* (Bur.) Sandw., 438.
——— *imperatori-maximiliani* (Wawra) Bur. & K. Schum., 439.
——— *jasminifolia* (H.B.K.) Miers, 438.
——— *pavettiflora* Sandw., 439, 440.
——— *stichadenia* K. Schum., 438.
——— *uleanum* Kraenzl., 438.
——— *variabilis* (Jacq.) Miers var. *castelnaei* Bur., 438.
Pogonostigma abyssinicum Hochst., 122.
——— Jaub. & Spach, 122.
——— *arabicum* Boiss., 122.
——— *boivini* Jaub. & Spach, 122.
——— *nubicum* Boiss., 122.
Polycarpaea spicata Arn., 218.
Polyporus fimbriatus Fr., 529.

- Polystachya albens* Ridl., 74.
 ——— subsp. *albescens*, 74.
 ——— subsp. *angustifolia* (Summerh.)
 Summerh., 75.
 ——— subsp. *imbricata* (Rolfe)
 Summerh., 74.
 ——— subsp. *kraenzlinii* (Rolfe)
 Summerh., 75.
 ——— subsp. *musozensis* (Rendle)
 Summerh., 75.
 ——— *imbricata* Rolfe, 74.
 ——— subsp. *angustifolia* Summerh.,
 75.
 ——— subsp. *imbricata*, 74.
 ——— subsp. *kraenzlinii* (Rolfe)
 Summerh., 75.
 ——— subsp. *musozensis* (Rendle)
 Summerh., 75.
 ——— *kraenzlinii* Rolfe, 75.
 ——— *musozensis* Rendle, 75.
Poronia oedipus (Mont.) Mont., 153.
 ——— *punctata* (Fr.) Fr., 153.
 ——— *ustorum* Pat., 106.
 Primulaceae : Tropical African, P.
 Taylor, 133.
 Procter, Noël J. : Simple Propagation
 (Rev.), 426.
Pseudodiscinella Dennis, 181.
 ——— *obstricta* (Karst.) Dennis, 183.
Pseudomarsdenia lanata P. G. Wilson, 168.
Psilotrichum sericeum (Hook. f.) Dalz., 218.
Psychotria hartwegii Benth., 88.
 ——— *laevis* DC., 88.
 ——— *uliginosa* Swartz, 88.
Pteris rugulosa Lab., 454.
 ——— *scaberula* A. Rich., 454.
Pteroglossaspis distans Summerh., 82.
Pteropodium glabrum DC., 434.
 Publications by Staff during 1957, 23.
Pycnoneurum Decne., 98.
 ——— *junciforme* Decne., 98.
Pygmaeothamnus W. Robyns, 98.
 ——— *zeyheri* (Sonder) W. Robyns, 98.
Quercus lanceaefolia Roxb., 514.
 Rajappan, K. and Erady, N. A. : A new
 species of *Oedogonium* from South
 India, 53.
 Raven, John, and Walters, Max : Moun-
 tain Flowers (Rev.), 395.
 Reid, Derek A. : A New Species of
Thelephora from Malaya, 227.
 ——— The genus *Cymatoderma* Jungh.
 (Cladoderris), 518.
Reseda abyssinica Fresen., 286.
 ——— *hexagyna* Forsk., 285.
 Review of the work of the Royal Botanic
 Gardens, Kew, during 1957, 1.
 Reviews : see Book Reviews.
Rhaphidorrhynchus moloneyi (Rolfe) Finet, 83.
Rhizina lignicola Rodway, 353.
Rhizophora harrisonii Leechman, 37.
 ——— *mangle* L., 37.
 ——— *racemosa* G. F. W. Meyer, 37.
Ritchiea G. Don, 100.
 ——— *capparoides* (Andrews) Britten, 100.
 ——— *fragrans* (Sims) G. Don, 100.
Rivea fringsheimiana Dammer, 189.
 Robson, N. K. B. : Notes on African
 Hypericum, 396.
 Rosaceae : Notes on African : V, R. A.
 Graham, 107.
 Ross-Craig, Stella : Drawings of British
 Plants, Part X, Saxifragaceae and
 Crassulaceae (Rev.), 224.
Roulinia Decne., 98.
 ——— *corymbosa* Decne., 98.
Rouliniella Vail, 98.
 ——— *corymbosa* (Decne.) Bullock, 98.
 Royal Botanic Gardens, Kew : Additions
 to the wild Flora & Fauna of: XXIII, 295.
 ——— Review of the work during,
 1957, 1.
 ——— Scientific and Administrative
 Staff, 25.
 Rubus from Tanganyika : A new species
 of, R. A. Graham, 107.
Rubus apetalus Poir., 107, 108.
 ——— var. *roseus* C. E. Gust., 107.
 ——— *keniensis* Standl., 107, 108.
 ——— *porotoensis* R. A. Graham, 107.
 ——— *scheffleri* Engl., 107, 108.
Rumfordia pinnatisecta P. G. Wilson, 164.
Rutstroemia White, 321.
 ——— *bertholletiae* Dennis, 152.
 ——— *firma* (Fr.) Karst., 346.
 ——— *hirsuta* Dennis, 459, 460.
 ——— *lanaripes* Dennis, 346, 347, 330.
 ——— *macrospora* (Peck) Kanouse, 346.
 ——— *petiolorum* (Roberge) White, 152.
 ——— *setulata* (Dearness & House) Whitc,
 460.
 Saba : The type of the generic name,
 A. A. Bullock, 391.
Saba Pichon, 391.
 ——— *comorensis* Pichon, 391.
 ——— *florida* (Benth.) Bullock, 391.
Sabicea Aubl. and *Stipularia* Beauv.
 (Rubiaceae-Mussaendeae) in Tropical
 Africa, F. N. Hepper, 289.
Sabicea Aubl., 289.
 ——— *adamsii* Hepper, 291.
 ——— *africana* (Beauv.) Hepper, 291, 292.
 ——— *brevispes* Wernham, 291.
 ——— *calycina* Benth., 292.
 ——— *capitellata* Benth., 289.
 ——— *cordata* Hutch. & Dalz., 291, 293.
 ——— *deweyi* De Wild. & Th. Dur., 291.
 ——— *efulenensis* (Hutch.) Hepper, 292.
 ——— *elliptica* (Hiern) Hepper, 292.
 ——— *gabonica* Hiern, 292.
 ——— *geophiloides* Wernham, 291, 293.
 ——— *harleyae* Hepper, 292.
 ——— *lanata* Hepper, 293.
 ——— *liberica* Hepper, 293.
 ——— *medusula* K. Schum., 291.
 ——— *rosea* Hoyle, 289.
 ——— *speciosa* K. Schum., 289.
 ——— *tchapensis* K. Krause, 292.
 ——— var. *glabrescens* Wernham, 292.
 ——— *urceolata* Hepper, 293, 291.
 ——— *venosa* Benth., 289.
 ——— *vogelii* Benth., 292, 293.
Salicornia pachystachya Ung.-Sternb., 218.

- Salisbury, E. J. : *Spergularia salina* and *Spergularia marginata* and their Heteromorphic Seeds, 41.
Saltera Bullock, 109.
 — *sarcocolla* (L.) Bullock, 109.
 Sands, M. J. S., 3.
 Sandwith, N. Y. : Contributions to the Flora of Tropical America : LXIV, 420.
 ——— LXV, 427.
 ——— Studies in Bignoniaceae : XXIII, 420.
 ——— XXIV, 427.
Sarcocolla Boehmer, 109.
 ——— Kunth, 109.
 ——— *linnaei* A. Juss., 109.
 ——— *squamosa* Kuntze, 109.
 ——— *tetragona* (Bergius) Salter, 109.
Sarokina lignicola (Rodway) Dennis, 353.
 ——— *microspora* (Berk.) Sacc., 354.
Satyrium aethiopicum Summerh., 257.
 ——— *bifolium* A. Rich., 257.
 ——— (L.) Wahlenb., 257.
Scandix L., 99.
 ——— *grandiflora* L., 99.
Schizolepton Fée, 451, 452.
 ——— *cordatum* Fée, 452.
Schizoloma billardieri Gaud., 451.
 ——— *cordatum* Gaud., 451.
 ——— *guerinianum* Gaud., 451.
Schizoxylon Chev., 356, 358.
 ——— *hansfordii* Dennis, 357, 358.
Schlegelia cornuta Donn. Sm., 440.
 ——— *costaricensis* Standl., 440.
 ——— *organensis* Kuhlm., 440.
 ——— *parviflora* (Oerst.) Monachino, 440, 443.
 ——— *ramizii* Sandw., 440.
 ——— var. *costaricensis* Sandw., 440.
 ——— var. *macrandra* Sandw., 440.
 ——— var. *trichandra* Sandw., 440.
 ——— *roseiflora* Ducke, 440.
Schmitzomia arundinacea (Pers.) Karst., 358.
 Schweinfurth, Charles : Orchids of Peru (Rev.), 254.
 Scientific Staff : List of Kew, 25.
Scleria dregeana Kunth, 150.
 ——— *flexuosa* Boeck., 150.
 ——— *glabra* Boeck., 150.
 ——— *gracillima* Boeck., 150.
 ——— *longispiculata* Nelves, 150.
 ——— *remota* Ridl., 150.
 ——— *tessellata* Willd., 150.
 ——— *welwitschii* C. B. Cl., 150.
Scobinaria Seibert, 441.
 ——— *amethystina* Dugand, 441.
 ——— *japurensis* (DC.) Sandw., 440.
 ——— *verrucosa* Siebert, 441.
Scutellinia spp., 151.
 Sedge Flora of Tanganyika : Additions to the, E. Nelves, 150.
Senecio bellioides Chiov., 218.
Senna italica Mill., 239.
 ——— *obovata* (Collad.) Batka var. *genuina* Batka, 240.
 ——— var. *pilosa* Batka, 240, 243.
 ——— var. *platycarpa* (Bisch.) Batka, 242.
Sesbania from Africa : A New Species of, S. I. Ali, 287.
Sesbania bispinosa (Jacq.) Wight, 288.
 ——— *macrantha* Phillip & Hutchinson, 288.
 ——— *sinuo-carinata* Ali, 287, 288.
 ——— *sphaerocarpa* Welw., 288.
Setilobus vicentinus Kraenzl., 441.
 Shebbeare, E. O. : Trees of the Duars and Terai (Rev.), 198.
Siegesbekia L., 165.
 Singer, Dr. R. : Ascomycetes collected by, in Bolivia and North Argentina, R. W. G. Dennis, 151.
 Skottsberg, Prof. Dr. C., 89.
 Snell, Walter H. and Dick, Ester A. : A Glossary of Mycology (Rev.), 403.
 Snowden, J. D. : The Grain Sorghums (Notice), 32.
Solanum pampalinii Chiov., 218.
Solenangis angustifolia Summerh., 280.
 Somaliland : *Xylocalyx* (Scrophulariaceae) in, J. B. Gillett and S. Carter, 359.
 Sorghums : Work by J. D. Snowden on (Notice), 32.
Sorokina lignicola (Rodway) Dennis, 353, 354.
 ——— *microspora* (Berk.) Sacc., 354.
 South Africa : A Hybrid *Dianthus* from, Sheila S. Hooper, 515.
Sparattosperma leucanthum (Vell.) K. Schum., 441, 442.
 ——— *lithontripticum* DC., 441.
 ——— *neurocalyx* Bur. & K. Schum., 442, 443.
 ——— *vernicosum* (Cham.) Bur. & K. Schum., 441, 442.
Spathodea ilicifolia Seem., 442.
 ——— *vernica* Cham., 441.
Spergularia salina and *Spergularia marginata* and their Heteromorphic Seeds, E. J. Salisbury, 41.
Spergularia marginata Kittel, 42.
 ——— *salina* J. S. & C. B. Presl, 41.
Sphaeria adscendens Fr., 102.
 ——— *allantodea* Berk., 105.
 ——— *cornudamae* Schwein., 103.
 ——— *feejeensis* Berk., 103.
 ——— *filiformis* Fr., 103.
 ——— *kegeliana* Lév., 104.
 ——— *multiplex* Kunze, 105.
 ——— *nigripes* Klotzsch, 105.
 ——— *papyrifera* Link, 105.
 ——— *phoenix* Kunze, 105.
 ——— *platypoda* Lév., 105.
 ——— *poitei* Lév., 105.
 ——— *scruposa* Fr., 106.
 ——— *telfairii* Berk., 106.
Sphagnicola Velenovsky : A Japanese Species of, R. W. G. Dennis and R. P. Korf, 181.
Sphagnicola ciliifera (Karst.) Vel., 181, 183.
 ——— var. *nuda* Vel., 181.
 ——— *iodocyanescens* Dennis & Korf, 181, 183.
 ——— *marchantiae* Vel., 181.
 ——— *obstricta* (Karst.) Dennis & Korf, 183.
 ——— *riularis* Vel., 181.

- Staff: List of Scientific and Administrative, 25.
 Staff: Publications by, during 1957, 23.
 Standley, Paul C., and Steyermark, Julian A.: Flora of Guatemala (Rev.), 386.
 Stearn, W. T.: Key to West Indian Mangroves, 33.
Stenolobium huancabambae Kraenzl., 432.
Sterculia tragacantha Lindl., 218.
Stereum caperatum (Berk. & Mont.) Berk., 522.
 ——— var. *lamellatum* (Berk. & Curt.) Cooke, 525.
 ——— var. *spongiaepes* (Berk.) Cooke, 526.
 ——— *fenixii* Lloyd, 523.
 ——— *flabellatum* Massee, 523.
 ——— *gausapatum* (Fr.) Fr., 529.
 ——— *goliath* Speg., 522.
 ——— *harristii* Massee, 523.
 ——— *hydroporum* var. *hylocrater* (Speg.) Massee, 522.
 ——— *hylocrater* Speg., 522.
 ——— *lamellatum* (Berk. & Curt.) Wakefield, 525.
 ——— *minimum* (Berk. & Broome) Lloyd, 530.
 ——— *plicatum* Lloyd, 527.
 ——— *radicans* (Berk.) Burt, 530.
 ——— *sclerotoides* Lloyd, 528.
 ——— *spongiaepes* Berk., 525.
 ——— *thwaitesii* (Berk. & Broome) Petch., 530.
Stictis Fr., 356, 358.
 ——— *arundinacea* Pers., 358.
 ——— *glaucoma* Berk. & Curt., 358.
Stictocardia Hallier f., 188.
 ——— *beraviensis* (Vatke) Hallier f., 189.
 ——— subsp. *laxiflora* (Bak.) Verdcourt, 189.
 ——— *laxiflora* (Bak.) Hallier f., 189.
 ——— *lutambensis* (Schulze-Menz) Verdcourt, 188.
 ——— *pringsheimiana* (Dammer) Hallier f., 189.
 ——— *woodii* (N. E. Br.) Hallier f., 189.
Stipularia Beauv. and Sabicea Aubl. (Rubiaceae-Mussaendeae) in Tropical Africa, F. N. Hepper, 289.
Stipularia Beauv., 289.
 ——— *africana* Beauv., 289, 292.
 ——— *efulenensis* Hutch., 292.
 ——— *elliptica* Hiern, 289, 292.
 ——— *mollis* Wernham, 293.
Stizophyllum flos-ardeae (Pittier) Sandw., 430.
 ——— *perforatum* (Cham.) Miers, 430.
 ——— *riparium* (H.B.K.) Sandw., 430.
Stolzia diffusa Summerh., 75.
 ——— *peperomoides* (Kraenzl.) Summerh., 75.
Struthiola (Thymelaeaceae): A New Species of the Genus, B. Peterson, 319.
Struthiola parviflora Meisn., 319, 320.
 ——— *rhodesiana* B. Peterson, 319, 320.
 ——— *scaettae* Staner, 320.
 ——— *thomsonii* Oliv., 319.
Styleria Raf., 283.
 Summerhayes, V. S.: African Orchids: XXV, 57.
 ——— XXVI, 257.
Symphostemon strictus Klotzsch, 31.
Syngramma J. Sm., 451, 452.
 ——— *alismifolia* (Pr.) J. Sm., 452.
 ——— *pinnata* J. Sm., 452, 453.
 ——— *quinata* (Hook.) Carr, 452, 453.
Syzygium aromaticum (L.) Merrill, 52.
Tabebuia avellanedae Griseb., 442.
 ——— *bureavii* Sandw., 442.
 ——— *dentata* Miers, 442.
 ——— *heptaphylla* (Vell.) Toledo, 442.
 ——— *japurensis* DC., 440.
 ——— *micrantha* Kraenzl., 440, 443.
 ——— *nodosa* (Griseb.) Griseb., 431.
 ——— *ochracea* (Cham.) Standl., 443.
 ——— *odontodiscus* var. *violascens* Toledo, 442, 443.
 ——— *roseo-alba* (Ridl.) Sandw., 421, 422, 425, 442, 443.
Taeniophyllum coxii (Summerh.) Summerh., 278.
Taeniothrips atratus (Hal.), 299.
 ——— *vulgatissimus* (Hal.), 299.
Taenitis Willd., 451, 452.
 ——— *blechnoides* (Willd.) Sw., 452, 453.
 ——— *pinnata* (J. Sm.) Holtt., 453.
Talinum polyandrum Hook., 400.
 ——— Ruiz & Pav., 400.
 Tanganyika: A New Species of *Gossypium* from Central, J. B. Hutchinson and B. J. S. Lee, 221.
 ——— Additions to the Sedge Flora of, E. Nemes, 150.
Tapesia epitephra (Berk.) Sacc., 333.
 ——— Rodway, 334.
 ——— *fusca* (Pers.) Fuck., 351.
Taphrina amentorum (Sadob.) Rostrup., 402.
 Taxonomy of Tephrosia in Africa: The indumentum of the style in the, with notes on *T. virgata* H. M. Forbes and *T. euchroa* Verdoorn, J. B. Gillett, 414.
 Taylor, Dr. G., The Director, 1.
 Taylor, Norman: Fragrance in the Garden (Rev.), 252.
 Taylor, P.: The Genus *Caylusea* St. Hil. in Tropical Africa, 283.
 ——— Tropical African Primulaceae, 133.
Tecoma amoena Kuntze, 432.
 ——— *atractocarpa* Bur. & K. Schum., 443.
 ——— *azaleiflora* H.B.K., 432.
 ——— *cohabambensis* (Herzog) Sandw., 432.
 ——— *dentata* Bur. & K. Schum., 442.
 ——— *fulgens* DC., 420, 422, 423, 424, 425, 426.
 ——— *garrocha* Hieron., 432.
 ——— *rosifolia* H.B.K., 432.
 ——— *salzmanni* DC., 441, 442.
 ——— *schumanni* Kraenzl., 442, 443.
Tecomaria rosifolia (H.B.K.) Seem., 432.
Telanthera pungens (H.B.K.) Moq., 174.
 Temperate Department: Review of the work during 1957, 16.
 Tephrosia in Africa: The indumentum of the style in the taxonomy of, with

- notes on *T. virgata* H. M. L. Forbes and *T. euchroa* Verdoorn, J. B. Gillett, 414.
- Tephrosia* in Tropical Africa : Notes on, J. B. Gillett, 111.
- Tephrosia* Section *Brissonia* DC., 414.
- *angulata* E. Mey., 121.
- *ansellii* Hook. f., 129.
- *anthylloides* Webb, 111, 114.
- *apollinea* Link., 415.
- *arabica* (Boiss.) Martelli, 122.
- *argyrotricha* Harms, 120, 119.
- var. *argyrotricha*, 120.
- var. *burtii* (Bak. f.) Gillett, 120.
- *atroviolacea* Bak. f., 128.
- *aurantica* Harms, 115, 116, 117, 415, 416, 417, 418.
- subsp. *hirsutostylosa* Dewit, 115, 116.
- *barba-jovis* (Burm. f.) Cufod., 121.
- *barbigera* Bak., 130.
- var. *bakeriana* (Hiern) Bak. f., 130.
- var. *subglabra* Bak. f., 130.
- *brunnea* Bak., 127.
- *burtii* Bak. f., 120.
- *canescens* E. Mey., 415.
- *capensis* Pers., 415, 418.
- *cephalophora* Harms, 117.
- *cordatistipula* Gillett, 131.
- *cordofana* Hochst., 111, 112.
- *coronilloides* Bak., 120, 119, 121.
- *decora* Bak., 119, 120.
- *delicata* Bak. f., 119.
- *dichrocarpa* A. Rich., 127, 415.
- *diffusa* (E. Mey.) Harv., 131.
- *discolor* E. Mey., 119, 118.
- *doggettii* Bak. f., 128.
- *dowsonii* Bak. f., 125.
- *drepanocarpa* Bak., 415.
- *elata* Defl., 415, 416.
- *elegans* Schumach., 119.
- *encoptosperma* Schweinf., 112.
- *euchroa* Verdoorn, 414, 416, 417, 418.
- *eylesii* Bak. f., 125.
- *flexuosa* G. Don, 129.
- *franchetii* Hutch. & Bruce, 115.
- *graminifolia* Chiov., 112.
- *griseola* H. M. L. Forbes, 418.
- *heckmanniana* Harms, 415.
- *hockii* De Wild., 115, 116, 117, 415, 418.
- subsp. *hirsutostylosa* (Dewit) Gillett, 115, 116, 415.
- *huillensis* Bak., 131.
- *humilis* Guill. & Perr., 130.
- var. *major* Bak. f., 130.
- *interrupta* Engl., 127, 415.
- subsp. *elongatiflora* Gillett, 128.
- subsp. *interrupta*, 127.
- subsp. *mildbraedii* (Harms) Gillett, 128.
- *jelfiae* Bak. f., 125.
- *kasikensis* Bak. f., 126, 127.
- *katangensis* De Wild., 115, 116, 117.
- *lathyroides* Guill. & Perr., 111, 112.
- *laxiflora* R. E. Fries, 125.
- *lebrunii* Cronq., 415, 418.
- *limpopoensis* Gillett, 418.
- *linearis* (Willd.) Pers., 118, 119, 120.
- subsp. *discolor* (E. Mey.) Gillett, 119, 415.
- subsp. *linearis*, 119.
- *longana* Harms, 120.
- *longipes* Meissn., 125, 415.
- var. *longipes*, 125.
- var. *lurida* (Sond.) Gillett, 125.
- var. *ringoetii* (Bak. f.) Gillett, 125.
- *lurida* Sond., 125.
- *lutea* R. E. Fries, 115.
- *mildbraedii* Harms, 128.
- *multiflora* Blatt. & Hall., 112.
- *nana* Schweinf., 130.
- var. *angolensis* Bak., 130.
- *noctiflora* Bak., 415.
- *nubica* (Boiss.) Bak., 122, 124, 125.
- var. *abyssinica* (J. & S.) Schweinf., 122.
- subsp. *arabica* (Boiss.) Gillett, 122.
- subsp. *nubica*, 122.
- var. *polyphylla* Chiov., 123.
- *nyikensis* Bak., 128, 415.
- *pallens* Pers. var. *angolensis* Bak. f., 120, 121.
- *paniculata* Bak. var. *schizocalyx* (Taub.) Gillett, 115.
- *pauciflora* Bak., 111, 112, 114.
- *paucijuga* Harms, 125.
- *petrosa* Blatt. & Hall., 114.
- *platycarpa* Guill. & Perr., 129.
- *pogonostigma* Boiss., 122.
- *polyphylla* (Chiov.) Gillett, 123, 124, 125.
- *polysperma* Bak., 130.
- *polystachya* E. Mey., 415, 418.
- *polystachyoides* Bak. f., 415.
- *prostrata* Nutt., 121.
- *pseudolongipes* Bak. f., 125.
- *pulchella* Hook. f., 119.
- *pumila* Pers., 415.
- *punctata* Gillett, 126.
- *purpurea* (L.) Pers., 111, 119, 415.
- var. *pubescens* Bak., 111.
- *reptans* Bak., 415, 418.
- *rhizomatosa* De Wild., 115, 116.
- *rhodesica* Bak. f., 415.
- *richardsiae* Gillett, 117.
- *ringoetii* Bak. f., 125.
- *rupicola* Gillett, 131.
- *schizocalyx* Taub., 115.
- *schweinfurthii* Defl., 115, 417.
- *secunda* Bak., 125.
- *seminuda* Bak., 119.
- *simplicifolia* Franch., 115.
- *stormsii* De Wild., 125.
- *subpraecox* Cronq., 116.
- *subtriflora* Bak., 111, 112.
- *sulphurea* Chiov., 112.
- *tanganicensis* De Wild., 415, 119.
- *transjubaensis* Chiov., 114.
- *uniflora* Pers., 111, 114.
- var. *parvifolia* Bak. f., 114.

- subsp. *petrosa* (Blatt. & Hall.) Gillett & Ali, 114.
 ——— subsp. *uniflora*, 114, 113.
 ——— *ustulata* Harms, 127, 128.
 ——— *verdickii* De Wild., 115, 116, 117.
 ——— *villosa* (L.) Pers., 121, 415.
 ——— var. *incana* (Roxb.) Bak., 124, 125.
 ——— (Michx.) Pers., 121.
 ——— *virgata* H. M. L. Forbes, 414, 416, 417, 418.
 ——— *zoutpansbergensis* Brem., 415, 416.
Thamnomycetes hippotrichoides [Sow.] Fr., 104.
Thelephora from Malaya: A New Species of, Derek A. Reid, 227.
Thelephora caperata Berk. & Mont., 522.
 ——— forma *elegans* (Jungh.) P. Henn., 524.
 ——— *dendritica* Pers., 523.
 ——— *gausapata* Fr., 529.
 ——— *lamellata* Berk. & Curt., 525.
 ——— *ramarioides* Reid, 227.
 ——— *spongiaspes* (Berk.) Berk. & Broome, 525.
 ——— *tuberosa* Speg., 522.
Thibaudia acuminata Wall., 482.
 ——— *offinis* Griff., 473.
 ——— *glabra* Griff., 473.
 ——— *myrtifolia* Griff., 499.
 ——— *obovata* (Wight) Griff., 507, 511.
 ——— *orbicularis* Griff., 511.
 ——— *pulcherrima* Hook., 478.
Thrips communis Uzel, 295.
 ——— *flavus* Schrank, 300.
 ——— *fuscipennis* Hal., 300.
 ——— *hukkineni* Priesner, 299.
 ——— *major* Uzel, 300.
 ——— *physapus* L., 299.
 ——— *tabaci* Lindeman, 300, 295.
 ——— *validus* Uzel, 299.
Thylachium papillososcabrum Chiov., 218.
 Thymelaeaceae: A New Species of the Genus *Struthiola*, B. Peterson, 319.
 Thysanoptera of Kew Gardens: The, Guy D. Morison, 295.
Tibouchina latibracteolata P. G. Wilson, 160.
 ——— *monticola* (Naud.) Cogn., 160.
Toxocarpus Wight & Arn., 98.
 ——— *crassifolius* Wight & Arn., 98.
 ——— *kleinii* Wight & Arn., 98.
 ——— *laurifolius* (Roxb.) Wight & Arn., 98.
Tragoceras Spreng., 163.
 Traub, Hamilton P.: The *Amaryllis* Manual (Rev.), 456.
 Trease, G. E.: A Textbook of Pharmacognosy (Rev.), 56.
Trichoglossum hirsutum (Fr.) Boud., 152, 458.
Trichoscyphella Nannfeldt, 323.
Trifolium somalense: a clover with tuberous roots, J. B. Gillett, 444.
Trifolium cheranganiense Gillett, 444, 446.
 ——— *semipilosum* Fres., 444.
 ——— *somalense* Taub., 444, 445, 446.
 ——— *stolzii* Harms, 444.
 ——— *subrotundum* Steud. & Hochst., 379.
Trigonella marginata Hochst. & Steud., 379.
Tripogon Roem. & Schult., 225.
 ——— *pauperculus* Stapf, 225, 226.
 Tropical Africa: Notes on Tephrosia in, J. B. Gillett, 111.
 Tropical Department: Review of the work during 1957, 19.
Tryblidiella rufula (Spreng.) Sacc. var. *fusca* (Ell. & Ev.) Rehm, 467.
 Tuffin, H. R.: Grapes, Peaches and Nectarines (Rev.), 198.
Turbina Raf., 217.
 ——— *stenosiphon* (Hallier f.) Meeuse var. *pubescens* Verdcourt, 217.
 Turrill, Dr. W. B., 1, 4, 29.
 ——— Recent researches on the botany of Juan Fernandez and Easter Island, 89.
Tweedia Hook. & Arn., 99.
 ——— *macrolepis* Hook. & Arn., 99.
Tympanis toomansii Berk. & Broome, 344.
 Type species of some generic names, A. A. Bullock, 97.
Urophyllum rubens Benth., 405.
 ——— *stipulosum* Hutch. & Dalz., 405.
 ——— *viridiflorum* Hiern, 405.
 ——— *ziamaeaeum* Jacques-Félix, 405.
Vaccinium acuminatum (G. Don) Kurz, 483.
 ——— *campanulatum* Kurz, 479.
 ——— *chaetothrix* Sleum., 511.
 ——— *macrostemon* Kurz, 475.
 ——— *miniaturum* (Griff.) Kurz, 480.
 ——— *monetarium* Sleum., 511.
 ——— *nummularia* C. B. Cl., 511.
 ——— *obovatum* Wight, 507.
 ——— *odontocentrum* Wight, 478.
 ——— *rugosum* Hook., 485.
 ——— *salignum* Hook. f., 477.
 ——— *scopulorum* W. W. Sm., 484.
 ——— *serpens* Wight, 499.
Vahea comorensis Bojer, 391.
Velloziella dracocephaloidea (Vell.) Baill., 442.
Velutarina rufo-olivacea (Fr.) Korf, 344.
 Venezuelani: Fungi: I, R. W. G. Dennis, 402.
 Verdcourt, B.: Moringa—a Correction, 384.
 ——— Notes from the East African Herbarium: V, 51.
 ——— VI, 185.
 ——— VII, 199.
 ——— VIII, 218.
 ——— Notes on African Convolvulaceae: II, 185.
 ——— III, 199.
Vincetoxicum: On the application of the name, A. A. Bullock, 302.
Vincetoxicum Medicus, 302.
 ——— Walter, 302.
 ——— *acanthocarpus* Walter, 302.
 ——— *album* (Miller) Asch., 302.
 ——— *gonocarpus* Walter, 302.
 ——— *hirundinaria* Medicus, 302.
 ——— *officinale* Moench., 302.
 Visitors to the Gardens during 1957, 15.
Vittaria J. Sm., 451, 452.

Vittaria scolopendrina (Bory) Thwait., 454.

Weather in the Gardens during 1957, 15.

Went, Frits W. : The Experimental Control of Plant Growth, with special reference to the Earhart Plant Research Laboratory at the California Institute of Technology (Rev.), 228.

West Indian Mangroves : Key to, W. T. Stearn, 33.

West Tropical Africa : Some additions to Pauridiantha and Bertiera (Rubiaceae) in, F. N. Hepper, 405.

Whitehead, S. B. : The Book of Flowering Trees and Shrubs (Rev.), 390.

Willoughby, Miss B., 2.

Wilson, C. P. H. : Bush Peaches (Rev.), 301.

Wilson, P. G. : Contributions to the Flora of Tropical America : LXIII, 155.

Worsdell, W. C., 4.

Wylia G. F. Hoffmann, 99.

— *radians* G. F. Hoffmann, 99.

Xylaria versus *Hypoxylon* and *Xylosphaera*, R. W. G. Dennis, 101.

Xylaria aemulans Starbäck, 153.

— *aenea* Mont., 102.

— *alutacea* (Pers.) S. F. Gray, 102.

— *apiculata* Cooke, 102.

— *appendiculata* Ferd. & Winge, 102.

— *arbuscula* Sacc., 104.

— *arenicola* Walw. & Curr. var. *brasiliensis* Theiss., 102.

— *aristata* Mont., 102.

— *axifera* Mont., 102.

— *berkeleyi* Mont., 102.

— *carpophila* var. *luxurians* Rehm, 104.

— *coccophora* (Mont.) Dennis, 103.

— *curta* Fr., 103.

— *dealbata* Berk. & Curt., 103.

— *deserticola* Speg., 103.

— *digitata* (Fr.) Grev., 101.

— *euphorbiicola* Rehm, 103.

— *fulvella* Berk. & Curt., 103.

— *hypoxylon* (Fr.) Grev., 101.

— *inaequalis* Berk. & Curt., 104.

— *juruensis* P. Henn., 104.

— *longipes* Nitschke, 104.

— *micrura* Speg., 104.

— *myosurus* Mont., 105.

— *nodulosa* Lloyd, 105.

— *oxyacanthae* Tul., 105.

— *palmicola* Winter, 105.

— *phosphorea* Berk., 105.

— *phyllocharis* Mont., 105.

— *polymorpha* (Fr.) Grev., 101.

— *regalis* Cooke, 105.

— *rickii* Theiss., 106.

— *ruginosa* Mont., 106.

— *schwackei* P. Henn., 106.

— *smilacicola* Speg., 106.

— *theissenii* Lloyd, 106.

— *venustula* Sacc., 106.

Xylocalyx (Scrophulariaceae) in Somaliland, J. B. Gillett and S. Carter, 359.

Xylocalyx Balf. f., 359.

— *asper* Balf. f., 359.

Xylosphaera : *Xylaria* versus *Hypoxylon*

and, R. W. G. Dennis, 101.

Xylosphaera Dumortier, 101, 102.

— *adscendens* (Fr.) Dennis, 102.

— *aemulans* (Starbäck) Dennis, 153.

— *aenea* (Mont.) Dennis, 102, 153.

— *anisopleura* (Mont.) Dennis, 102, 153.

— *apiculata* (Cooke) Dennis, 102.

— *appendiculata* (Ferd. & Winge) Dennis, 102.

— *aristata* (Mont.) Dennis, 102.

— *axifera* (Mont.) Dennis, 102.

— *berkeleyi* (Mont.) Dennis, 102.

— *brasiliensis* (Theiss.) Dennis, 102.

— *bulbosa* [Pers.] Dumortier, 103.

— *carpophyla* [Pers.] Dumortier, 103.

— *coccophora* (Mont.) Dennis, 103.

— *comosa* (Mont.) Dennis, 103, 153.

— *cornu-damae* (Schwein.) Dennis, 103.

— *cubensis* (Mont.) Dennis, 103, 153.

— *cupressiformis* [Mich.] Dumortier, 103.

— *curta* (Fr.) Dennis, 103, 153.

— *dealbata* (Berk. & Curt.) Dennis, 103.

— *deserticola* (Speg.) Dennis, 103.

— *dichotoma* (Mont.) Dennis, 103.

— *digitata* (Mérat) Dumortier, 103.

— *euphorbiicola* (Rehm) Dennis, 103.

— *feejeensis* (Berk.) Dennis, 103.

— *filiformis* (Fr.) Dennis, 103.

— *fulvella* (Berk. & Curt.) Dennis, 103.

— *grammica* (Mont.) Dennis, 103, 154.

— *guaranitica* (Speg.) Dennis, 104.

— *guyanensis* (Mont.) Dennis, 104, 154.

— *hippochroides* (Fr.) Dennis, 104.

— *hyperythra* (Mont.) Dennis, 104.

— *hypoxylon* [L.] Dumortier, 104.

— *ianthino-velutina* (Mont.) Dennis, 104.

— *inaequalis* (Berk. & Curt.) Dennis, 104.

— *juruensis* (P. Henn.) Dennis, 104.

— *kegeliana* (Lév.) Dennis, 104.

— *longipes* (Nitschke) Dennis, 104.

— *luxurians* (Rehm) Dennis, 104.

— *melanopus* (Lév.) Dennis, 104.

— *mellisii* (Berk.) Dennis, 104.

— *microceras* (Mont.) Dennis, 104.

— *micrura* (Speg.) Dennis, 104.

— *multiplax* (Kuntze) Dennis, 105, 154.

— *myosurus* (Mont.) Dennis, 105.

— *nigripes* (Klotzsch) Dennis, 105.

— *nodulosa* (Lloyd) Dennis, 105.

— *oxyacanthae* (Tul.) Dennis, 105.

— *palmicola* (Winter) Dennis, 105.

— *papyrifera* (Link) Dennis, 105.

— *phoenix* (Kuntze) Dennis, 105.

— *phosphorea* (Berk.) Dennis, 105.

— *phyllocharis* (Mont.) Dennis, 105.

— *platypoda* (Lév.) Dennis, 105.

— *poitei* (Lév.) Dennis, 105.

— *polymorpha* (Mérat) Dumortier, 105, 102.

— (Saint Amans) Dumortier, 154.

— *regalis* (Cooke) Dennis, 105.

— *rhizocola* (Mont.) Dennis, 105.

— *rhizomorpha* (Mont.) Dennis, 105.

— *rickii* (Theiss.) Dennis, 106.

— *ruginosa* (Mont.) Dennis, 106.

— *schwackei* (P. Henn.) Dennis, 106.

— *scruposa* (Fr.) Dennis, 106, 154.

- *smilacicola* (Speg.) Dennis, 106.
- *telfairii* (Berk.) Dennis, 106, 154.
- *theissenii* (Lloyd) Dennis, 106.
- *ustorum* (Pat.) Dennis, 106.
- *venustula* (Sacc.) Dennis, 106.

Youngman, Barbara J. : "Parsnip"
Dermatitis, 387.

- Zinnia jugistyla* P. G. Wilson, 163.
- Zoellneria Velenovsky : The Genus,
R. W. G. Dennis, 398.
- Zoellneria acerum* Vel., 398.
- *clelandii* (Hansford) Dennis, 324.
- *eucalypti* (Berk.) Dennis, 324.
- *rosarum* Vel., 327, 398, 399.

the capsule. Dehiscence is loculicidal but the seeds appear to remain undispersed for some time. The fruit in *Balfour* 697 is not mature, but it seems as though it may be much less asymmetric.

Should the examination of further material show this suspected difference in the fruit to be real, this together with the indumentum characters already noted may well lead future workers to accept the existence of two varieties or even species but for the present it seems prudent to follow Balfour and Vierhapper in suspending judgement on this point.

Literature cited.

- I. B. Balfour (1888). Botany of Socotra (Trans. Roy. Soc. Edin. 31) p. 205 t. 63.
 F. Vierhapper (1907). Beitr. zur Kenntniss der Flora Südarabiens und der Inseln Sokotra, Semha und Abd el Kuri (Denk. Math. Nat. Wiss. Class. Kais. Ak. Wiss. Wien Bnd. 71) p. 135 (455).

A pocket bird-book for West Africa.*—The visitor to the tropics who is interested in ornithology has always had difficulty in naming the many unfamiliar birds he sees around him. Even if there is a standard reference book and he is able to afford and obtain it, he may find it quite unsuitable to carry around for use in the 'wilds'.

West Africa, thanks to the industry of Dr. D. A. Bannerman, has been well provided with reference books on birds. His standard work 'The Birds of Tropical West Africa', published in eight volumes between 1930 and 1951 is now largely out of print and is difficult and expensive to obtain. His condensed work 'The Birds of West and Equatorial Africa' was published in two volumes in 1952, and went a long way towards meeting the need for a handy reference book.

Now Penguin Books have published 'Larger Birds of West Africa' by the same author. This is in their usual pocket size and sells for only half a crown. It describes in detail practically every species of the larger (non-Passerine) birds known to occur between the Senegal river and the Cameroon highlands, except for migrants from Europe.

At least one representative of most of the families is portrayed in a black and white illustration by Henrick Grönvold. After each description is given a brief habitat note and the known distribution within West Africa. The book also contains a Glossary of technical terms to assist the beginner, but unfortunately lacks an index.

Both the experienced ornithologist and the tyro bird-watcher going to West Africa will find this book essential. It should also have a ready sale among the younger generation of Africans who are beginning to appreciate the wealth of wild life around them.

E. MILNE-REDHEAD.

*'Larger Birds of West Africa' by D. A. Bannerman, pp. 195, 54 illustrations. Penguin Books, West African Series (W.A.10), 1958. 2/6.